



Oakcrest Planned Unit Development

Draft Environmental Impact Report

City of Oakland

EIP Associates

May 1992



File No. ER 88-37

Ref. No. PUD 88-367City of Oakland
Oakland, CaliforniaDRAFT ENVIRONMENTAL IMPACT REPORT FOR:
Oakcrest Planned Unit Development

(Project Name)

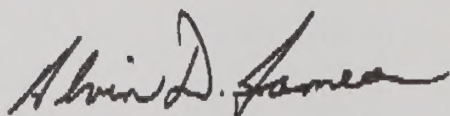
California Environmental Quality Act (CEQA)

RELEASE OF REPORT FOR PUBLIC REVIEW

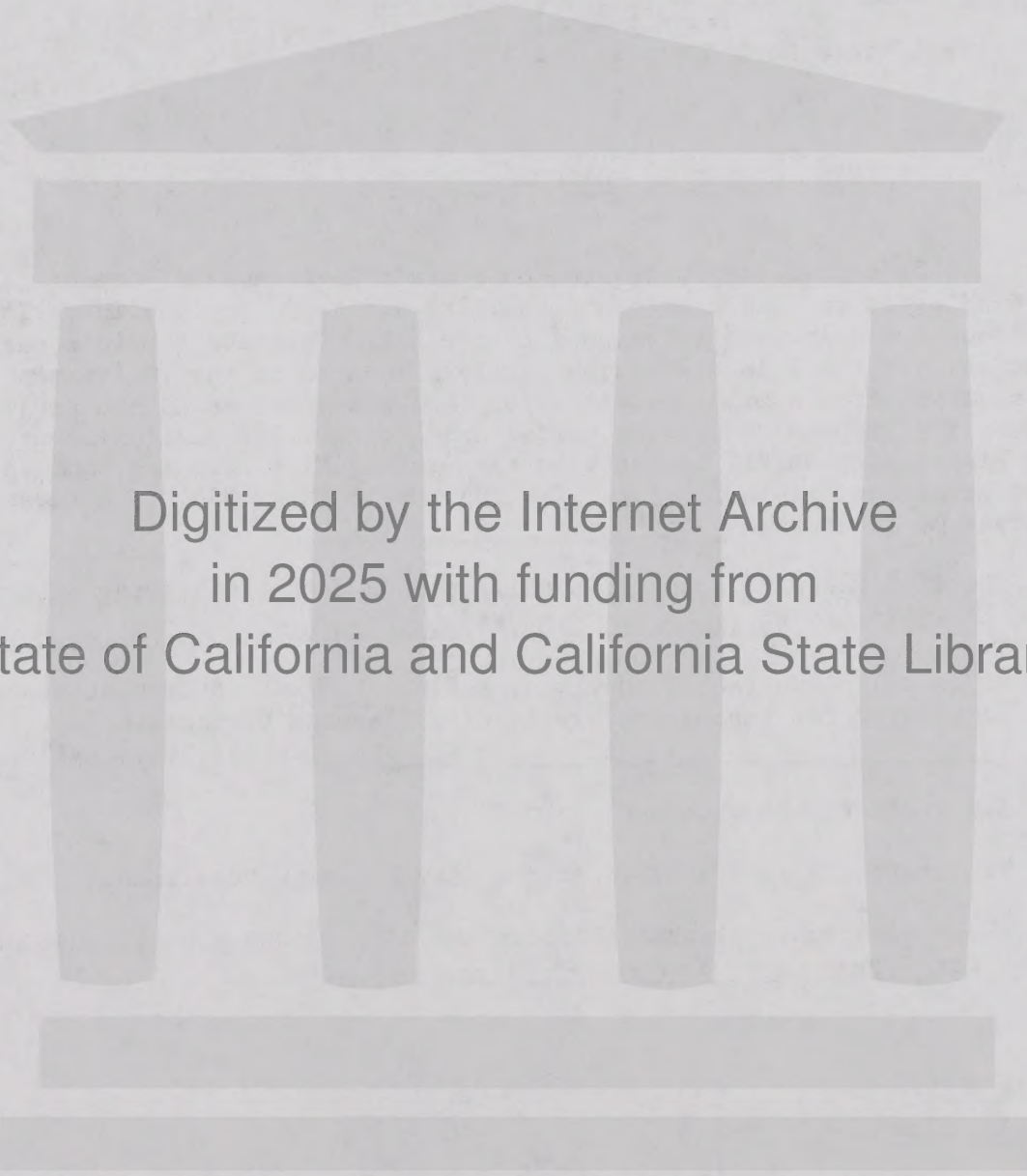
The City of Oakland is hereby releasing this draft Environmental Impact Report (EIR), finding it to be accurate and complete and ready for public review. Members of the public are invited to respond to the EIR. Comments should focus on the sufficiency of the EIR in discussing possible impacts on the environment, ways in which adverse effects might be minimized, and alternatives to the project in light of the EIR's purpose to provide useful and accurate information about such factors. Please address all comments to the Oakland City Planning Commission, 6th Floor, City Hall, One City Hall Plaza, Oakland, California, 94612. Comments should be received no later than June 29, 1992.

- ☒ The City Planning Commission will conduct a public hearing on the draft EIR on June 10, 1992 at 6:30 P.M. at the Lakeside Garden Center, 666 Bellevue Avenue, Oakland, CA.
- ☐ After all comments are received, a final EIR will be prepared and considered for acceptance by the City Planning Commission on _____ at _____ in Room 115, City Hall.
- ☒ The draft EIR is attached.
- ☐ The draft EIR is available at the City Planning Department.

If you have any questions, please telephone the City Planning Department at 238-3941. Ask for Nixon Lam, Assistant Planner.


ALVIN D. JAMES
Director of City Planning

DATE: May 6, 1992



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TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1-1
2. SUMMARY	2-1
2.1 Project Description	2-1
2.2 Growth Inducement	2-1
2.3 Alternatives to the Proposed Project	2-2
2.4 Summary Table: Environmental Impacts and Mitigation Measures	2-4
3. PROJECT DESCRIPTION	3-1
3.1 Objectives of the Project Sponsor	3-1
3.2 Project Site	3-1
3.3 Project Characteristics	3-5
3.4 Required City Permits and Approvals	3-13
4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES	4.1-1
4.1 Land Use and Relationship to Plans and Policies	4.1-1
4.2 Soils and Geology	4.2-1
4.3 Drainage	4.3-1
4.4 Vegetation and Wildlife	4.4-1
4.5 Traffic and Circulation	4.5-1
4.6 Visual Quality	4.6-1
4.7 Public Services and Utilities	4.7-1
4.8 Energy 4.8-1	
4.9 Noise 4.9-1	
5. GROWTH INDUCEMENT	5-1
6. UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS	6-1
7. ALTERNATIVES TO THE PROPOSED PROJECT	7-1
7.1 Alternative One: No Project	7-1
7.2 Alternative Two: Rearranged Site Plan	7-2
7.3 Alternative Three: Reduced Units on Lower Portion of Site	7-4

	<u>Page</u>
8. EIR AUTHORS AND PERSONS CONSULTED	8-1
EIR Authors	8-1
Project Sponsor	8-2
Persons Consulted	8-2

APPENDICES

A.	Initial Study
	Notice of Preparation (NOP) and Responses
B.	Geotechnical Investigation
C.	Biological Resources
D.	Traffic and Circulation
E.	Typical Noise Levels

LIST OF FIGURES

	<u>Page</u>
3-1 Regional Location Map	3-2
3-2 Project Vicinity Map	3-3
3-3 Aerial Photo of Site	3-4
3-4 Site Plan	3-6
3-5 Townhouse Elevations	3-7
3-6 Single-Family Elevations	3-8
3-7 Architectural Model	3-9
3-8 Architectural Model	3-10
3-9 Architectural Model	3-11
4.2-1 Geology Map	4.2-2
4.2-2 Fault Zones Map	4.2-4
4.2.2A Special Studies Zone Map	4.2-6
4.2-3 Conceptual Grading Plan	4.2-10
4.4-1 Tree Inventory	4.4-7
4.5-1 PM Peak Hour Traffic Count at Redwood Road/Chestnut Drive Intersection	4.5-5
4.5-2 Recommended Circulation Mitigation Measures	4.5-14
4.6-1 Project Site as Seen from High Street, West of Interstate 580	4.6-2
4.6-2 Existing View of Project Site Looking North Across Crestmont Drive and Redwood Road	4.6-3
4.6-3 Existing View of Project Site Looking East from Samaria Lane	4.6-4
4.6-4 Existing View of Project Site Looking Southeast	4.6-5
4.6-2A View of Project Site Looking North Across Crestmont Drive and Redwood Road with the Project (photomontage)	4.6-7
4.6-3A View of Project Site Looking East from Samaria Lane with the Project (photomontage)	4.6-9
4.6-4A View of Project Site Looking Southeast with the Project (photomontage)	4.6-10

LIST OF TABLES

		<u>Page</u>
2-1	Summary of Impacts and Mitigations	2-4
3-1	Oakcrest Planned Unit Development Area Summary	3-12
4.5-1	Existing Roadway Vertical Grades	4.5-3
4.5-2	Trip Generation for the Oakcrest Project	4.5-7
4.5-3	Cumulative Project Trip Generation	4.5-8
4.5-4	Projected Peak-Hour Intersection Volume-to-Capacity (V/C) and Levels of Service (LOS)	4.5-9
4.5-5	Project Parking Evaluation	4.5-17
4.8-1	Annual Project Energy Use	4.8-3
4.9-1	Typical Construction Equipment Noise Levels at 50 ft. from Source (dBA)	4.9-3
7-1	Parking Comparison	7-4
7-2	Parking Comparison, Lower Portion of Site	7-6

1. INTRODUCTION

This Draft Environmental Impact Report (DEIR) has been prepared in compliance with the California Environmental Quality Act of 1970 (CEQA). The report has been focused, pursuant to Section 15080 of the CEQA Guidelines, on those items identified as potentially significant by the City of Oakland in their Initial Study of the proposed project (Appendix A, page A-1, contains the complete text of the Initial Study).

The project sponsor, Oakcrest Development, Inc., proposes the development of a Planned Unit Development (PUD) on approximately four acres in the Oakland hills, about one mile northeast of Mills College. A PUD is a large, integrated development which adheres to a comprehensive plan and is located on a single tract of land, or on two or more tracts of land which may be separated only by a street or other right-of-way (Oakland Zoning Regulations Section 7800 et seq.). The PUD would include 32 residential units; one-half would be detached single-family homes; one-half would be clustered townhouses. The project site is located at the northwest corner of the Redwood Road/Crestmont Drive intersection.

This Draft EIR evaluates the potentially significant environmental effects associated with the proposed Oakcrest PUD project. The analyses contained herein address project-specific impacts and cumulative impacts to which the project would contribute. This Draft EIR is intended to enable the City of Oakland and the general public to evaluate the physical environmental effect of the proposed project, methods to mitigate significant adverse effects should the project be approved, and possible alternatives to the current proposal. The Draft EIR will be used by City decision makers in deciding whether to approve or deny the proposal, and those conditions that would be appropriate for the project if it were to be approved.

2. SUMMARY

2.1 PROJECT DESCRIPTION

The proposed project would be the construction of a 32-unit residential Planned Unit Development (PUD) on an approximately four-acre undeveloped hillside in the Oakland hills. The proposed site, located immediately northeast of the Redwood Road/Crestmont Drive intersection, would be divided into upper and lower portions. The upper portion of the site would contain 15 detached single-family homes along a new 400-foot-long road/cul-de-sac, accessed via Redwood Road opposite Old Redwood Road. The lower portion of the site would contain 16 townhouse units (clustered in seven structure) and one detached single-family home, located along a new 250-foot-long road/bulb-cul-de-sac accessed via Crestmont Drive opposite Samaria Lane.

Detached single-family homes on the upper portion of the site would be three-bedroom units ranging in size from 2,500-2,765 sq. ft. The townhouse units on the lower portion of the site would be three-bedroom units ranging in size from 1,440-1,740 sq. ft. The detached single-family home on the lower portion of the site would be about 1,820 sq. ft.

The project would require the removal of up to one-half of the 32 coast live oak trees present on the site; a comprehensive Landscape Plan will be submitted to the City and approved prior to the issuance of building permits.

2.2 GROWTH INDUCEMENT

The proposed project conforms to current zoning regulations for the site; current zoning regulations in turn are consistent with the Oakland Comprehensive Plan. The project would not require the expansion to the municipal infrastructure not already under consideration. The project would not create major employment opportunities.

If developed successfully, the project could induce adjacent property owners to pursue their own developments.

2.3 ALTERNATIVES TO THE PROPOSED PROJECT

Alternative One: No Project

This alternative would entail no change to the site. The proposed project would not be built. None of the impacts associated with the proposed project would occur. The proposed project site would remain in an undeveloped, unimproved condition. No grading of the hillside would occur, and no coast live oak trees would be removed. The free-flowing operation of the Redwood Road/Crestmont Drive intersection would remain. The on-street parking occupancy along Crestmont Drive would not change. There would be no change in energy demand at the site. Temporary construction noise impacts would not occur.

Visual impacts associated with the proposed project would not occur under this alternative; the project site itself, and in conjunction with the undeveloped adjacent properties to the north and east, would remain as a continuous open hillside. Potentially growth-inducing effects of the proposed project would not occur under this alternative.

Alternative Two: Rearranged Site Plan

This alternative would rearrange the location of some proposed units on the site, while maintaining the density proposed under the project. The alternative would switch the location of two detached single-family units from the upper portion of the site, and six townhouse units from the lower portion of the site. The proposed upper and lower access roads would generally be the same as under the proposed project.

This alternative would have all of the impacts identified for the proposed project, save a five-car parking deficit at the lower portion of the site.

Alternative Three: Reduced Units On Lower Portion Of Site

This alternative would reduce the number of townhouse and single-family units on the lower portion of the site; development of the upper portion of the site would be the same as under the proposed project. The 30 mature coast live oak trees located on the oak knoll would be retained, and would

not require extensive pruning. Potential root damage associated with construction of the eliminated units would not occur. This alternative would require the removal of brush, minor tree pruning some minor grading of the oak knoll adjacent to Crestmont Drive, to provide acceptable minimum sight distances for vehicles exiting the site from the proposed lower access road.

This alternative would have a total on-site parking deficit of three, compared to nine under the proposed project; this deficit would be reduced to two, compared to five, if visitor parking demand were accommodated along Crestmont Drive. Views of the lower portion of the site from Redwood Road below Crestmont Drive, and along Crestmont Drive between Redwood Road and Samaria Lane, would be primarily of the undeveloped oak knoll; under the proposed project, the oak knoll from these vantages would have fewer trees and prominent townhouses. Environmental effects related to public services and utilities, energy, and construction noise would all be slightly reduced under this alternative, compared to the proposed project.

2.4 ENVIRONMENTAL EFFECTS

Table 2-1, below, summarizes the potential environmental impacts of the proposed project and corresponding mitigation measures (where applicable), and identifies the level of significance (i.e., significant, less-than-significant) before and after implementation of the proposed mitigation measures.

TABLE 2-1
SUMMARY OF ENVIRONMENTAL EFFECTS

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
4.1 LAND USE AND RELATIONSHIP TO PLANS AND POLICIES					
4.1-1	The project would develop 32 units of housing on a currently undeveloped hillside.	LS	4.1-1	None required.	LS
4.2 SOILS AND GEOLOGY					
4.2-1	The project would increase the number of dwelling units in an area subject to seismic groundshaking.	S	4.2-1	The structures would be designed using the Uniform Building Code standards for UBC Seismic Zone 4, as minimum standards of performance.	LS
4.2-2	Grading activities on hillside sites have the potential to reactivate existing slope instabilities by undercutting the support of upslope materials. The placement of fill could overload the ability of slopes to support the weight of upslope material. Additionally, landscape irrigation could saturate soils in filled areas, contributing to slope instability.	S	4.2-2	Excavation pit walls would be protected so that slumping of loose material into the pits would not occur. The contractor would comply with the Excavation Standards of the Occupational Safety and Health Agency. Whenever possible, excavation and construction would take place during the dry season. If winter excavation is necessary, an Erosion and Sediment Transport Control Plan would be required by the Office of Public Works. Detailed closure procedures would be specified and completed prior to the rainy season of each year. Foundations and retaining walls would be designed to withstand lateral pressure below the ground surface to prevent soil creep to the extent possible. A seismic analysis should be prepared. Based on the results of the analysis, the buildings would be	LS

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
			designed to withstand the expected groundshaking the study indicated would occur at the site in the event of a major earthquake.	
			Nonstructural elements of the buildings, such as hanging light fixtures, hung ceilings, wall partitions, and mechanical equipment should be attached firmly to reduce the likelihood of their falling during an earthquake.	
4.3 DRAINAGE				
4.3-1	The volume of storm-water runoff leaving the site would increase by as much as one cubic foot per second, following construction of the proposed project.	LS	4.3-1 The project sponsor's civil engineer shall prepare a Site Drainage Plan, including the predicted additional flow, and outlining the capacity, peak flow and tie-in with the City storm-drain system. The plan would be subject to approval by the Oakland Office of Public Works. The project sponsor may be requested to provide on-site detention or payment of an in-lieu fee to the City Office of Public Works.	LS
4.3-2	Construction activities at the site of the proposed project could increase the erosion of soils on, or down slope from, the site, thus increasing sediment load and decreasing water quality.	S	4.3-2 The project sponsor's civil engineer shall prepare a comprehensive, staged Erosion and Sediment Transport Control Plan that would cover temporary control measures for the construction period and permanent control measures to apply during the useful lifetime of the project. The plan would be subject to approval by the City of Oakland Office of Public Works, and the Alameda County Flood Control and Water Conservation District. Mass grading would be confined to the dry season. Detailed closure procedures would be specified and completed prior to the beginning of the rainy season of each year.	LS

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
4.3-3	Project operation could result in cumulative deterioration of the downstream quality of storm-water runoff.	LS	4.3-3	The CC&Rs for the PUD should stipulate that a regular and frequent program of vacuum sweeping of the on-site drives and parking areas shall be implemented and maintained to reduce the buildup of contaminants on paved surfaces.	LS
4.4 VEGETATION AND WILDLIFE					
4.4-1	The proposed project would require the removal of up to half of the coast live oak trees present on the site, and could disrupt trees intended for retention.	S	4.4-1	A qualified arborist should be retained by the project sponsor to evaluate the current health of the trees to be retained, and determine the extent to which pruning can safely be accomplished. The arborist should also advise the general contractor regarding the extent of tree root structures, and methods to avoid unnecessary damage to those trees intended to be retained. A landscape plan shall be submitted to the City of Oakland Office of Parks and Recreation. The landscape plan should emphasize the use of new plantings of native coast live oak trees, and other species common to the oak woodland setting present at the project site. The plan should also emphasize the use of drought-tolerant plant species, and the use of water-saving drip irrigation systems.	LS
4.4-2	The project would result in the loss of approximately one acre of serpentine grassland from the site.	LS	4.4-2	None required.	LS
4.4-3	The project would cause the loss of some coastal sage scrub plant community from the site.	LS	4.4-3	None required.	LS

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
4.4-4	The project would disrupt wildlife species which currently occupy or visit the site.	LS	4.4-4	None required.	LS
4.5 TRAFFIC AND CIRCULATION					
4.5-1	The project would generate about 240 daily vehicle trips, of which about 34 would occur during the p.m. peak hour.	LS	4.5-1	None required.	LS
4.5-2	Vehicular access to the upper portion of the site would require a public access easement from the City's Office of Public Works. To obtain such an easement, the project must not be detrimental to traffic flow on Redwood Road.	S	4.5-2	The curb lane on the north side of Redwood Road, where it would intersect with the proposed upper access road, should be widened to the east and west of the upper access road. In addition, new directional signs should be added.	LS
4.5-3	The length and the slope of the upper access road would exceed the City's Office of Public Works maximum recommended standards for public and private streets.	S	4.5-3	The upper access road should have a surface designed and maintained to support the imposed loads of fire apparatus; the surface should provide all weather driving capabilities.	LS
4.5-4	The existing topography and vegetation near the proposed lower access road would limit sight distances for vehicles exiting that road.	S	4.5-4	Adequate sight lines for vehicles exiting the lower access road would be created if vegetation were pruned and brush cleared, and the southwestern portion of the oak knoll slightly graded. The general contractor should measure the sight distance from the exit lane of the lower access road to Redwood Road, to ensure that an unobstructed sight distance of no less than 200 feet has been achieved.	LS
4.5-5	The configuration of the proposed lower access road would limit the maneuverability of emergency vehicles on the project site.	S	4.5-5	The island medium should be reduced in size. This would require removal of one or both oak trees which otherwise would be preserved at this location (for further discussion of the biological	S

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
			effects of this mitigation measure, please see Chapter 4.4, Vegetation and Wildlife).	
			Curb returns at locations identified in Figure 4.5-3 should be modified to provide a minimum 15-foot radius.	
4.5-6	The proposed project would provide eight fewer parking spaces at the lower portion of the site than estimated resident and visitor demand.	S	4.5-6 As shown in Figure 4.5-3, the five-space resident parking deficit could be eliminated if the two detached two-car garages and the three on-street perpendicular parking spaces were replaced by eight on-street perpendicular parking spaces, and four angled parking spaces at the northwest side of the lower access road turn-around. This mitigation measure would require the removal of an additional five trees from this portion of the site (see Chapter 4.4, Vegetation and Wildlife, for the biological effects of this measure). Alternately, this deficit would be eliminated if the placement of some of the clustered townhouse units at the lower portion of the site, and some of the detached single-family homes at the upper portion of the site, was reversed. This alternative development scheme is analyzed under Alternative Two, Rearranged Site Plan.	SU
4.5-7	There are no sidewalks along Redwood Road or Crestmont Drive adjacent to the project site, making pedestrian travel at these locations unsafe.	S	4.5-7 A continuous sidewalk should be provided adjacent to the project site along Redwood Road and Crestmont Drive. The new sidewalk should be designed in conformance with applicable Department of Public Works standards, and should include associated curbs and gutters, and be handicap-accessible.	LS

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
4.6 VISUAL QUALITY					
4.6-1	The project would replace open hillside terrain and would be visible from near and distance vantage points. The project, located between adjacent open hillside areas to the east and northwest, would appear to divide the otherwise continuous hillside.	LS	4.6-1	Vegetative screening, as described in Chapter 4.4, should be incorporated into final project design. New plantings of native coast live oak trees should be implemented to replace those trees removed or damaged during construction, and to increase the tree coverage on the site. Exterior building finishes and roofing materials should be selected with sensitivity to the surrounding landscape and land uses. Light colored materials are preferred as they tend to blend in well with the surrounding grassland and scrub setting.	LS
4.7 PUBLIC SERVICES AND UTILITIES					
4.7.1-1	The project would affect local fire protection services by increasing the number of households in the "critical fire zone" of the Oakland hills. The "critical fire zone" area is characterized by steep slopes and highly flammable species of vegetation. The project would therefore constitute a significant fire protection impact.	S	4.7.1-1	To ensure adequate emergency access and fire protection measures, the project would be required to comply with the standards of the Oakland Uniform Building Code and the Uniform Fire Code. Roofs, exterior surfaces and interior walls should be made of stucco or other non-combustible material. Interconnected smoke detectors should be provided in all of the units for increased safety. Spark arrestors should be placed on all chimneys. Standard residential standard fire sprinklers should be installed in the interior of all buildings.	LS

TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Building setbacks at least 30 feet from surrounding "natural" open space areas should be provided.	
		A homeowners association should institute a vegetative fuel management program (periodic weed abatement and brush removal).	
		The project landscape program should use low-fuel, native, drought tolerant plant species. The landscape program should also balance water conservation, fuel load limitation, visual screening, and habitat enhancement needs in choosing plant species.	
		The project sponsor should provide stipulations (deed restrictions, etc.) as approved by the Fire Department regarding minimum clearances around project structures that should be kept free of highly flammable vegetation.	
		The project circulation system should establish adequate emergency vehicle access to permanent open space or wildland areas between the proposed homes identified as S7 and S8, located at the end of the upper road cul-de-sac.	
		As applicable, the project should be designed with a system of fuel breaks between wooded areas and residential units (i.e., areas where the volume and spacial arrangement of vegetation is modified to retard the progress of an approaching fire). Within each fuel break area, Sage scrub (high volume fuel) should be removed and replaced with native perennial grassland (lower volume fuels and higher biotic value). Any vegetation that is	

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
				removed should be replaced with a species of equal or higher biotic value that are fire-resistant.	
4.7.1-2	Off-site fire hydrant locations in the project vicinity would be insufficient for service to the project site and would be considered a significant impact.	S	4.7.1-2	One fire hydrant with adequate flow on the upper roadway and one fire hydrant with adequate flow on the lower driveway should be provided to reduce impacts to less than significant levels. Adequate flow for the project is defined by the Fire Department requirements as 1,500 gallons per minute with 20 pounds of residual pressure in the main.	LS
4.7.1-3	Water pressure for fire protection would be substandard and this would be considered a significant impact.	S	4.7.1-3	The project sponsor should request that EBMUD evaluate the fire flow of the present distribution system during its hydraulic analysis. If fire flow performance is below the standards of the Fire Department, EBMUD should make improvements to the water distribution system so that it is capable of meeting the Fire Department's fire flow standards.	LS
4.7.3-1	The estimated 13 elementary school children generated by the project would require one-third of a portable class room.	LS	4.7.3-1	Existing school district regulations would require the project sponsor to pay the District's development impact fee prior to issuance of a building permit. The fee would amount to approximately \$117,110 based upon the project's 74,120 square feet of development and the District's impact fee of \$1.58.	LS
4.7.4-1	The proposed project would significantly impact the park and recreation resources of the City of Oakland.	LS	4.7.4-1	Therefore, to satisfy the City PUD zoning standards to mitigate park and recreational impacts, the project sponsor may wish to mitigate the proposed project's park and recreational impact; one of the following options could be undertaken:	LS

TABLE 2-1 (Continued)

Impact		Significance Before Mitigation	Mitigation Measures		Significance After Mitigation
2-12			- The project sponsor should provide a 0.25 acre tot lot, play area, or mini-park in or near the Oakcrest project; or - The project sponsor should provide in-cash or in-kind resources of equivalent value to the resource costs as mutually agreed between the project sponsor and the Office of Parks and Recreation, to enhance the Pinto Recreation Area.		
	4.7.5-1 The existing water distribution system capacity in the vicinity of the project may be insufficient to serve the proposed project's domestic needs and the Fire Department's fire flow requirements (1,500 gallons per minute with 20 pounds of residual pressure in the main).	S	4.7.5-1	The project sponsor would be required to pay the cost of any system improvements required to serve the proposed project as determined by a hydraulic analysis prepared by EBMUD. The project sponsor should work with EBMUD to develop residential units that are equipped with modern water conserving appliances and landscaping.	LS
	4.8 ENERGY				
	4.8-1 The project would increase the consumption of nonrenewable energy resources during project construction and operation. Project-generated motor vehicle traffic would consume gasoline, oil and diesel fuel during transportation of residents to and from the project site.	LS	4.8-1	The project sponsor is required by law to demonstrate compliance with the stringent standards of the California Administrative Code, Title 24, prior to issuance of a building permit.	LS
	4.9 NOISE				
	4.9-1 Construction of the proposed project would take place over a period of between 24 and 30 months, and would temporarily increase	LS	4.9-1	During project construction, the operation of heavy equipment should be limited to the daytime weekday working hours (8:00 a.m. to 5:00 p.m.) to	LS

TABLE 2-1 (Continued)

Impact	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
noise levels in areas surrounding the project site. The nearest sensitive noise receptors are residences across Crestmont Drive, about 80 feet from the lower portion of the site.		minimize potential noise disturbances to adjacent residents. Stationary noise sources should be enclosed and as far from adjacent residences as possible. Construction vehicles should be well muffled and maintained, and all equipment including impact tools should be fitted with effective mufflers, shields, or shrouds. Construction equipment noise, except that of impact tools, should be limited to 85 dBA at 100 feet. The project sponsor should meet with the Office of Public Works prior to the start of construction to determine an appropriate construction schedule to minimize construction noise impacts on the surrounding neighborhood.	

3. PROJECT DESCRIPTION

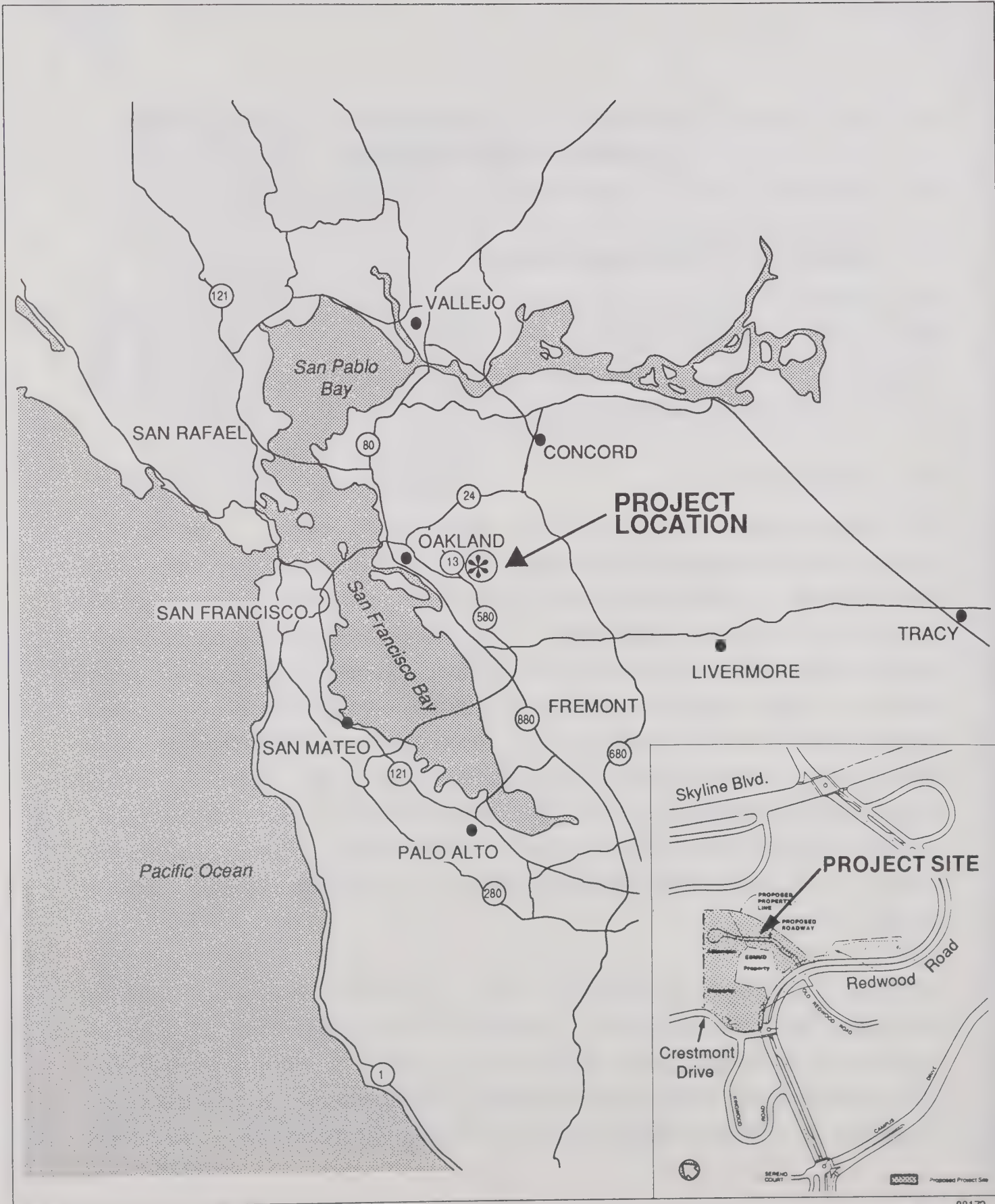
3.1 OBJECTIVES OF THE PROJECT SPONSOR

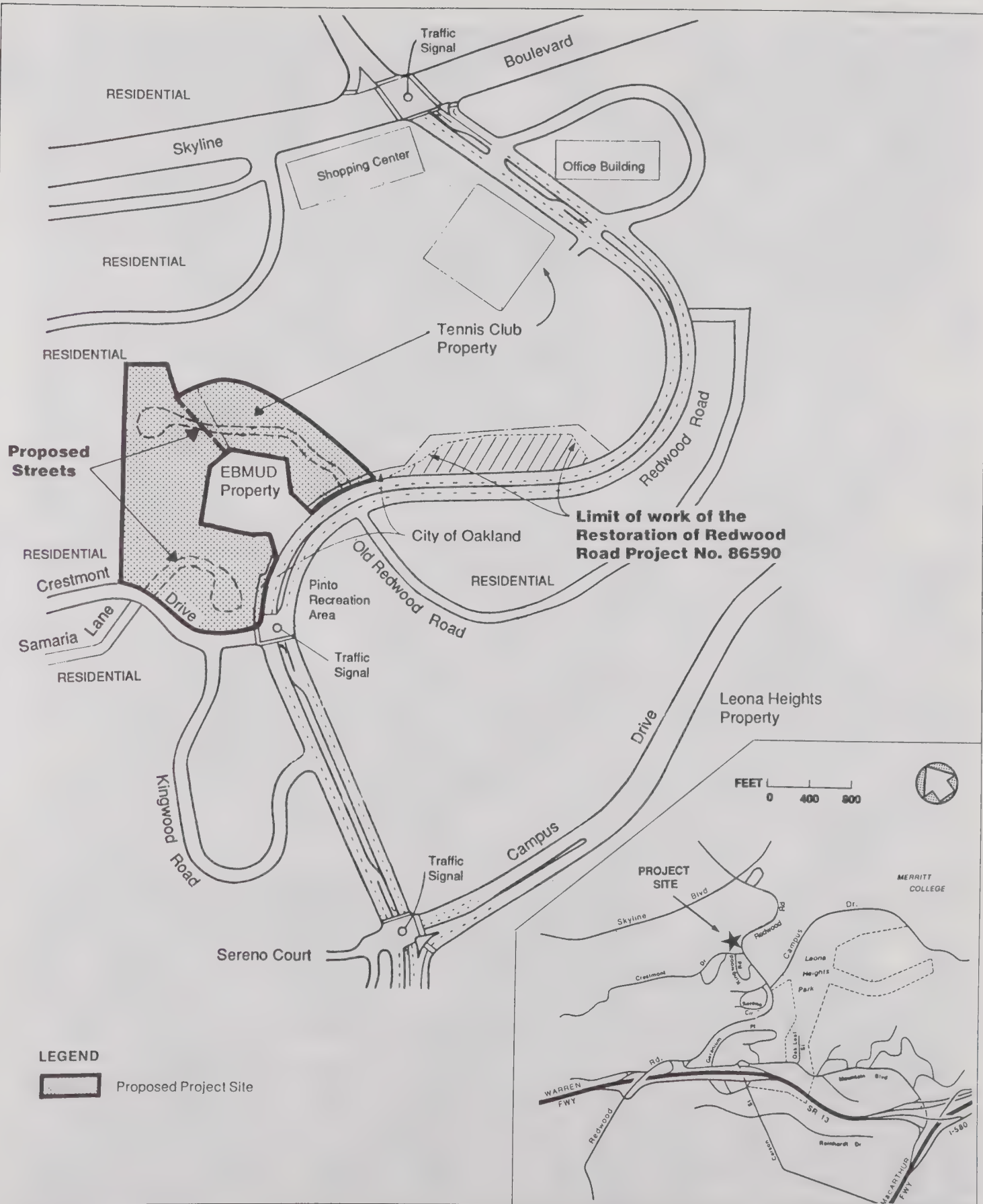
The project sponsor's objectives are to develop a 32-unit residential Planned Unit Development (PUD) consisting of detached single-family homes and attached single-family townhouses. It is assumed that another objective of the project sponsor is to realize the maximum potential financial benefit from his investment, including the type, amount and location of units on the site.

3.2 PROJECT SITE

The proposed project would be located on a hillside directly northeast of the Redwood Road/Crestmont Drive intersection in the Oakland hills (see Figure 3-1, page 3-2). The four-acre project site is also about two-tenths of a mile north of Merritt College and the Leona Heights Park, and about one mile northeast of Mills College. At present, the project site is a steep, undeveloped hillside, primarily covered by native and non-native grassland and scrub, with smaller areas containing oak, pine, eucalyptus, and other mature trees (see Chapter 4.4, Vegetation and Wildlife, for a complete discussion of the plant and animal communities present at the site). The project site is roughly horseshoe-shaped, and surrounds a property owned by the East Bay Municipal Utilities District (EBMUD) (see Figures 3-2 and 3-3, pages 3-3 and 3-4). The northeastern portion of the site (slightly less than one-half of the entire site) is currently owned by the adjacent Oakland Hills Tennis Club; this portion of the site would be acquired by the project sponsor upon city approval of the PUD application.

The project site elevation rises from about 725 ft. Oakland City Datum (OCD)¹ along the southwestern property line, to about 875 ft. along the northeastern property line. The rapid change in elevation results in slope grades of between 30 and 55 percent. To the north of the site is a continuation of the open hillside, followed by detached single-family homes. To the east of the site is a continuation of the open hillside, followed by the Oakland Hills Tennis Club. To the south of





SOURCE: THOMSON ENGINEERS

FEET 0 90 180



3-4



the site, across Redwood Road, is the Pinto Recreation Area, the Leona Heights Park, and detached single-family homes. To the west of the site, across Crestmont Drive, are detached single-family homes. Due to the location and the steepness of the project site, it is visible from nearby and distant locations, and possesses unobstructed views of Oakland, San Francisco, Alameda and the Peninsula (see Chapter 4.6, Visual Quality, for a discussion of project visual quality effects).

3.3 PROJECT CHARACTERISTICS

The proposed project would be a Planned Unit Development (PUD) consisting of 32 dwelling units on an approximately four-acre, horseshoe-shaped site, as shown in Figures 3-4 through 3-9, pages 3-6 through 3-11. A PUD is a large, integrated development adhering to a comprehensive plan, which has flexibility in the application of certain regulations in a manner consistent with the general purposes of the Zoning Regulations. For the proposed project, a PUD is required for the development of multiple-family dwelling units in an R-30 zoning district.

The upper portion of the site would consist of 15 single-family detached dwellings with lot sizes averaging about 5,400 square feet (sq. ft.) each. These units would each contain three bedrooms and a two-car garage, and would range in size from 2,500 to 2,765 sq. ft. (see Table 3-1, page 3-12).

The lower portion of the site would consist of 16 clustered three-bedroom townhouse units and one single-family detached unit, with lot sizes averaging approximately 5,000 sq. ft. each. The 16 clustered units would be grouped in twos and threes. One- and two-car garages would be interspersed among the townhouse units, providing 1.5 parking spaces per townhouse unit for the proposed development.

Access to the upper portion of the site would be via a new 400-foot-long road connecting to Redwood Road (opposite Old Redwood Road); this new road would terminate in a cul-de-sac. Access to the lower portion of the site would be via a new 250-foot-long road connecting to Crestmont Drive (opposite Samaria Lane); this road would terminate in a bulb-cul-de-sac.

The project site contains about 32 coast live oak trees at the southwest portion of the site. Most consist of single-trunked trees measuring up to 24 inches in diameter, and are estimated to be 75 to 100 years old. The oak and bay trees on the northwest corner of the site are primarily multi-trunked trees, indicating that they have been burned or cut in the past. The intention of the project sponsor is to retain as many of the existing trees as possible. However, approximately one-half of the trees

SITE PLAN

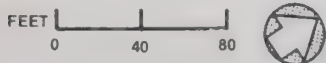
FIGURE 3-4



LEGEND

- T Townhouse Units
- S Single-Family Units

SOURCE: COLLABORATIVE DESIGN ARCHITECTS

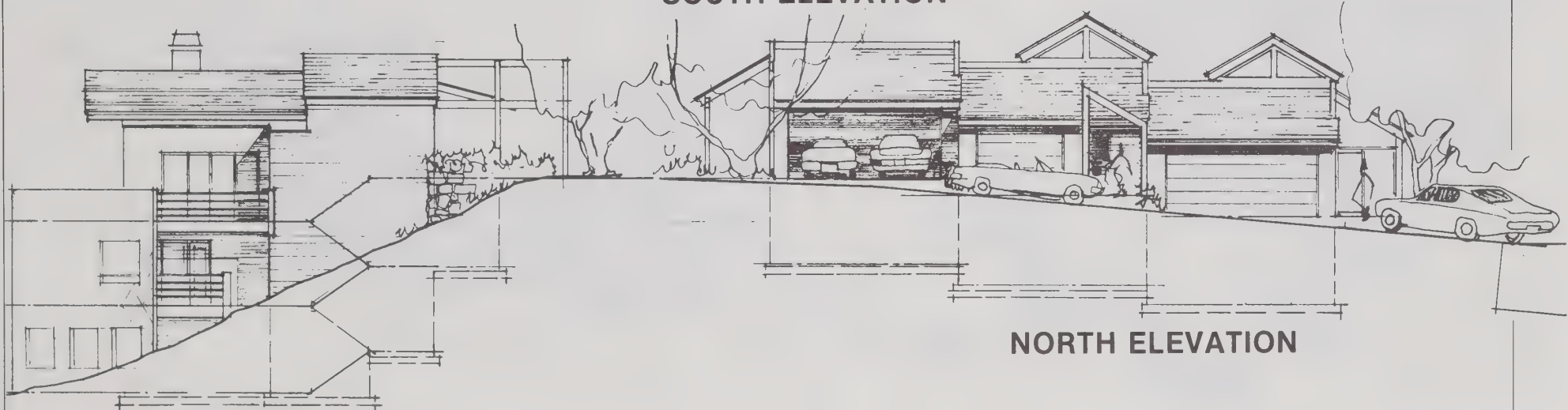


TOWNHOUSE ELEVATIONS

FIGURE 3-5



SOUTH ELEVATION



NORTH ELEVATION

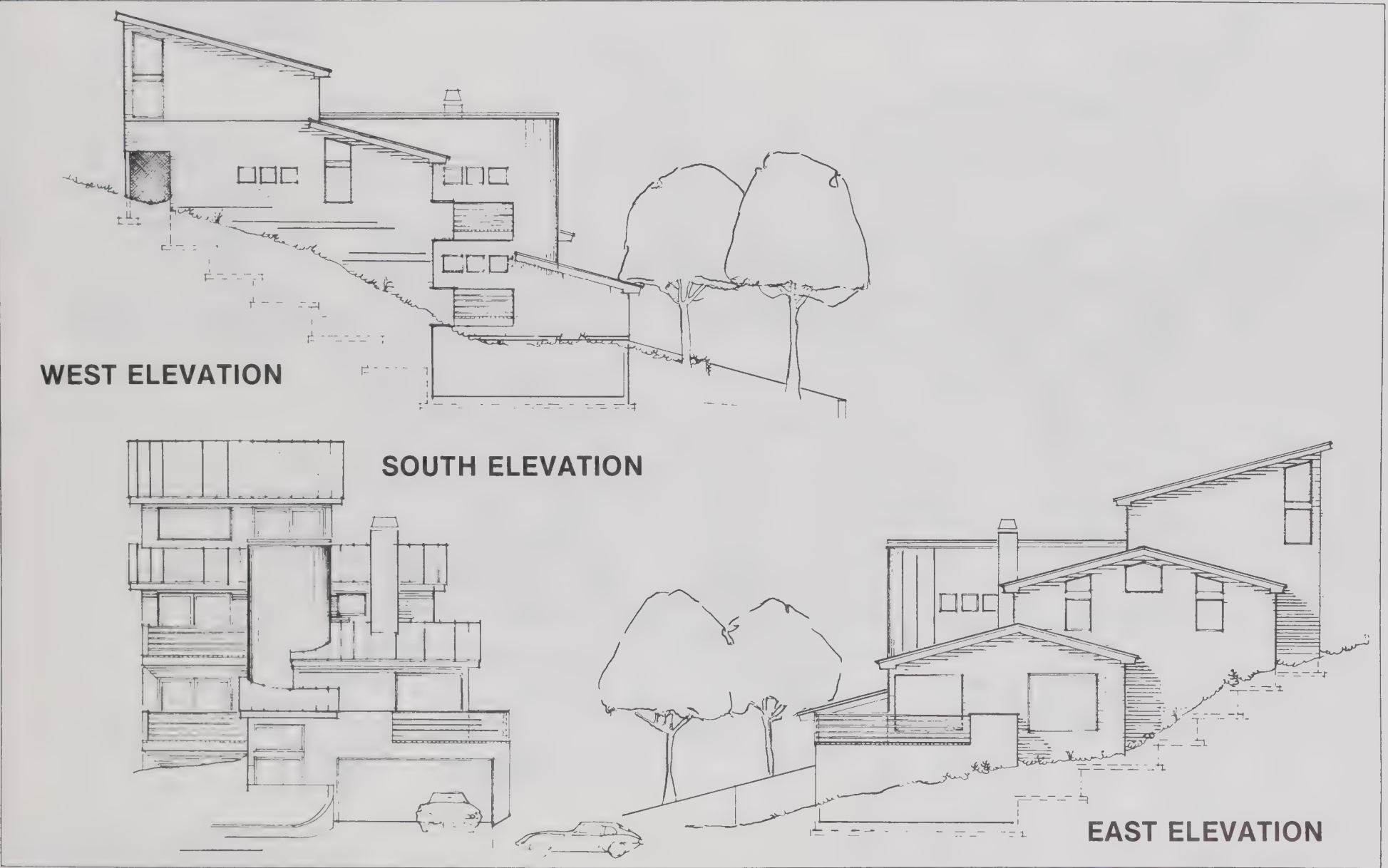
EAST ELEVATION

SOURCE: COLLABORATIVE DESIGN ARCHTIECTS

NO SCALE

eip

88172



SOURCE: COLLABORATIVE DESIGN ARCHITECTS

NO SCALE

88172



SOURCE: COLLABORATIVE DESIGN ARCHITECTS
NO SCALE



SOURCE: COLLABORATIVE DESIGN ARCHITECTS

NO SCALE



SOURCE: COLLABORATIVE DESIGN ARCHITECTS
NO SCALE

TABLE 3-1
OAKCREST PLANNED UNIT DEVELOPMENT FLOOR AREA SUMMARY

Lower Portion of Site

Groups of Three Townhouses

Center Unit ¹	1,720	sq. ft.	Garage	280	sq. ft.	2,000 sq. ft.
End Unit ²	1,740	sq. ft.	Garage	400	sq. ft.	2,140 sq. ft.
End Unit	<u>1,740</u>	sq. ft.	Garage	<u>400</u>	sq. ft.	<u>2,140</u> sq. ft.
Cluster	5,200	sq. ft.		1,080	sq. ft.	6,280 sq. ft.
No. of Clusters	<u>x 4</u>			<u>x 4</u>		<u>x 4</u>
	20,800	sq. ft.		4,320	sq. ft.	25,120 sq. ft.

Groups of Two Townhouses

End Unit	1,740	sq. ft.	Garage	200	sq. ft. (detached)	1,940 sq. ft.
End Unit	<u>1,440</u>	sq. ft.	Garage	<u>200</u>	sq. ft. (detached)	<u>1,640</u> sq. ft.
Cluster	3,180	sq. ft.		400	sq. ft.	3,580 sq. ft.
No. of Clusters	<u>x 2</u>			<u>x 2</u>		<u>x 2</u>
	6,360	sq. ft.		800	sq. ft.	7,160 sq. ft.

Single-Family Home	1,820	sq. ft.	Garage	400	sq. ft.	2,220 sq. ft.
--------------------	-------	---------	--------	-----	---------	---------------

Lower Portion Total

Building Area	28,980	sq. ft.		5,520	sq. ft.	34,500 sq. ft.
---------------	--------	---------	--	-------	---------	----------------

Upper Portion of Site

Downslope Units	2,765	sq. ft.
No. of Units	<u>x 8</u>	
	22,120	sq. ft.

Upslope Units	2,500	sq. ft.
No. of Units	<u>x 7</u>	
	17,500	sq. ft.

Upper Portion Total Building Area						39,620 sq. ft.
-----------------------------------	--	--	--	--	--	----------------

TOTAL BUILDING AREA						74,120 sq. ft.
---------------------	--	--	--	--	--	----------------

¹One center unit per cluster of three townhouses.²Two end units per cluster of three townhouses.

Source: Collaborative Design Architects; EIP Associates.

on site would be removed as part of the project. Some of the retained trees would require extensive pruning. As part of the project, a comprehensive landscaping plan would be developed, emphasizing the use of new native coast live oaks, and drought-tolerant plant species; this plan was not available during preparation of the EIR.

Construction of the proposed project would take 24 to 30 months to complete.

3.4 REQUIRED CITY PERMITS AND APPROVALS

The project, prior to approval and occupancy, would be required to comply with the following permits and regulations:

- Zoning Regulations
- Planned Unit Development criteria and procedures
- Subdivision Map Regulations (Tract Map)
- Grading Ordinance
- Title 24 Energy Conservation Standards
- Health and safety-related requirements of the Building, Housing and Fire Prevention Codes
- Tree Preservation Ordinance (as revised, May 1990): Trees covered by this ordinance include Oaks (with 4" or more girth) and all others (9" or more girth), except eucalyptus. A permit is required for removal, if the tree falls within 10 feet of building footprint, and/or building activity occurs within 30 feet.
- Design Review Controls: Evaluation of the individual residences' architectural characteristics would occur through implementation of the city-wide Design Review Controls which applies to residential PUD proposals.

To provide access to the upper portion of the site from Redwood Road as shown in Figure 3-2, the project sponsor would be required to obtain an easement from the City of Oakland to cross the City's property east of the project site. The Oakland Office of Public Works requires that a traffic study be conducted, illustrating that such an easement, which would allow access to the site, would not be detrimental to traffic flow conditions on Redwood Road. This study has been conducted and is summarized in EIR Chapter 4.5, Traffic and Circulation.

-
1. Oakland City Datum is 2.998 feet above mean sea level.

4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

4.1 LAND USE AND RELATIONSHIP TO PLANS AND POLICIES

SETTING

The proposed Oakcrest Planned Unit Development (PUD) would be located on a hillside directly northeast of the Redwood Road/Crestmont Drive intersection in the Oakland hills. The project site is roughly horseshoe-shaped, and surrounds a property owned by the East Bay Municipal Utility District (EBMUD) (see Figures 3-2 and 3-3, pages 3-3 and 3-4). The northeastern portion of the site (approximately 1.75 acres) is currently owned by the adjacent Oakland Hills Tennis Club; this portion of the site would be acquired by the project sponsor upon city approval of the PUD application.

The project site elevation rises from about 725 ft. Oakland City Datum (OCD)¹ along the southwestern property line, to about 875 ft. along the northeastern property. The rapid change in elevation results in slope grades of between 30 and 55 percent. To the north of the site is a continuation of the open hillside, followed by detached single-family homes. To the east of the site is a continuation of the open hillside, followed by the Oakland Hills Tennis Club. To the south of the site, across Redwood Road, is a baseball diamond, the Leona Heights Park, and detached single-family homes. To the west of the site, across Crestmont Drive, are detached single-family homes. Due to the location and the steepness of the project site, it is visible from nearby and distant locations, and possesses unobstructed views of Oakland, San Francisco, Alameda and the Peninsula (see Chapter 4.6, Visual Quality, for a discussion of project visual quality effects).

The proposed project site is designated for "Low-Density Residential" in the Land Use Element of the Oakland Comprehensive Plan (General Plan), with an allowable lot size of 5,000 to 9,999 sq. ft. of land per unit. The project site is zoned R-30 (One-Family Residential) in the City of Oakland

Zoning Regulations, which state that "the R-30 Zone is intended to create, preserve, and enhance areas for single-family dwellings in desirable settings for urban living, and is typically appropriate to already developed lower-density dwelling areas of the City."² R-30 allows a ratio of one lot per 5,000 sq. ft., less the land area required for right-of-ways. Dimensions for R-30 subdivision and development as indicated in the Oakland Zoning regulations include:

- Minimum average lot width of 45 ft.
- Minimum street frontage of 25 ft.
- Maximum height of buildings of 30 ft.
- Minimum front yard depth of 20 ft.
- Minimum side yard width along interior side lot lines of five ft.
- Minimum rear yard depth of 20 ft.

The Regulations and Procedures governing Planned Unit Developments (PUDs) are contained in Sections 7800-7849 and 9400-9424, respectively, of the Oakland Zoning Regulations. The purposes of these regulations are "...to encourage the appropriate development of tracts of land sufficiently large to allow comprehensive planning, and to provide flexibility in the application of certain regulations in a manner consistent with the general purposes of the Zoning Regulations, thereby promoting a harmonious variety of uses, the economy of shared services and facilities, compatibility with surrounding areas, and the creation of attractive, healthful, efficient, and stable environments for living, shopping, or working." These Regulations and Procedures would be applicable to the proposed project because the project sponsor proposes development of multiple-family dwellings in an R-30 zoning district, which without a PUD, would limit new development to lower-density single-family units.

Several policies in the Oakland Policy Plan, a key component of the Oakland Comprehensive Plan, are relevant and applicable to the proposed project site.³ These policies can be grouped into two major categories: 1) those which aim to preserve the natural environment (including plant and animal resources); and 2) those which address land use development issues. These policies stress the importance of conservation of natural resources, particularly given the steep topography of the proposed project site. As part of the approval process for the Planned Unit Development, the City Planning Commission will review the proposed project in the context of applicable goals and policies of the Policy Plan. Relevant goals and policies of this Comprehensive Plan Component are delineated below.

OAKLAND POLICY PLAN

LAND USE GOALS AND POLICIES

Goal: "To protect and improve Oakland's physical environment." (55637)⁴

Policies Relating to the Natural Setting

Policy 1: "Urban development wherever it occurs should be related sensitively to the natural setting, with the scale and intensity of development in each case bearing a reasonable relationship to the physical characteristics of the site." (55637)

Consistency: The project grading plan would minimize extensive grading of the hillside by avoiding the cut and fill "bench" approach to grading the site. Instead, the site would be divided into upper and lower portions, and home sites would generally conform to the hillside topography. Landscape and Site Drainage Plans will be prepared and approved prior to the issuance of building permits; a Tree Removal Permit is also required.

Policy 4: "Development on slopes of 15 to 30 percent should generally be designed with special attention to controlling runoff and erosion and to preserving the natural topography as much as possible. Cuts and fills and the removal of desirable vegetation should be minimized." (55637)

Consistency: The project would require some cut and fill, but would retain the knoll at the southwest portion of the site. Proposed buildings would generally conform to the existing topography of the hillside. However, up to one-half of the 32 coast live oak trees would be removed, requiring a Tree Removal Permit; eucalyptus, pine and acacia trees would not be removed from the site. The project sponsor would prepare a landscaping plan to show replacement of existing trees that would be removed.

Goal: "To conserve existing neighborhoods and other areas, while encouraging new development in locations compatible with such conservation." (58889)

Policies on Land Use Regulation, Mixture and Transition

Policy 1: "The City will employ zoning or other land use regulations to ensure that land uses are compatible with their surroundings and to promote appropriate design and on-site conditions for residents or other users." (58889)

Policy 2: "The City will see that the land use regulations applying to each area are compatible with its particular desired functions and character, and where appropriate provide for an orderly transition of use type or density over time." (58889)

Consistency: The project would be compatible with the surrounding neighborhood which is dominated by residential uses. The project would require City Planning Commission approval of the proposed Planned Unit Development (PUD). The City Planning Commission would also review the PUD in the context of its consistency with the PUD procedures found in Sections 7800 and 9400 of the Oakland Zoning Regulations.

Policies on Density and Dwelling Types

Policy 4: "The City encourages appropriate mixtures of different dwelling types within planned unit developments in the Hills." (58889)

Policy 6c: "The City will seek to ensure on a continuing basis that, in the aggregate, its land use regulations provide enough variety of suitable potential sites to allow for new housing with a wide range of densities, dwelling types, locations, and kinds of surroundings." (58889)

Consistency: The project would include a mix of detached single-family homes, and clustered townhouse units, as part of the Planned Unit Development. Detached homes are proposed for the upper portion of the site, while townhouse units are proposed for the lower portion of the site.

OPEN SPACE & NATURAL RESOURCES GOALS AND POLICIES

Goals: "To conserve with care the open space and natural resources which will be needed by present and future generations;" and "To protect and improve Oakland's physical environment." (55637)

Consistency: Although the proposed project site itself, and the adjacent properties to the north and east, are zoned for residential uses, they are currently in an undeveloped state. This expanse of open hillside, while unimproved and potentially unsafe for pedestrian use, is nevertheless viewed as an open space resource by local residents. Development of the proposed project would convert a portion of this hillside from open space to residential use.

Plant and Animal Resources

Policy 1: "Efforts should be made to perpetuate the full range of plant types and plant communities, and therefore also wildlife variety, found in Oakland." (53298)

Policy 2: "Special attention should be given to the protection of rare and endangered species." (53298)

Policy 3: "Where new development occurs, examples of native vegetation should be retained and, where feasible, large sections should be left undisturbed for ecological, educational, and aesthetic benefit. Where appropriate, the development should incorporate a diversity of suitable new plant materials to provide food and shelter for wildlife." (55637)

Consistency: No rare or endangered plant or animal species would be affected by the proposed project. The project would, however, require the removal of up to one-half of the 32 coast live oak trees present on the site. Eucalyptus, pine and acacia trees, and about one-half of the coast live oak trees on the site would be retained. The proposed development would also result in the loss of serpentine habitat. The sensitive species of Presidio Clarkia, although not found on the site, are found exclusively on serpentine habitat areas. The proposed project would include a comprehensive Landscape Plan, and would retain the services of a qualified arborist during sensitive site preparation activities.

IMPACTS AND MITIGATION MEASURES

Land use impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

Impact

4.1-1 The project would develop 32 units of housing on a currently undeveloped hillside.

The proposed project would have individual lot sizes of about 5,000 sq. ft. per residential unit. This lot size is consistent with the Land Use (Low-Density) and Zoning (R-30) requirements for this area and would not be considered significant. The project's 32 dwelling units would also be consistent with the other development standards contained in Zoning Regulations Section 3450 et seq., which controls land uses in R-30 zoning districts.

The project would require some cuts and fills to accommodate the proposed site plan. The project would also require the removal of up to half of the trees existing on site. The environmental effects of the cut and fill and the removal of trees are discussed in Chapters 4.2 Soils and Geology, and 4.4 Vegetation and Wildlife. The project would conform to the steep topography of the site by being divided into upper and lower portions. Landscape and Site Drainage Plans will be prepared and approved prior to the issuance of building permits. A Tree Removal Permit would also be required.

Mitigation Measure

4.1-1 None required.

-
1. Oakland City Datum is 2.998 feet above mean sea level.
 2. City of Oakland, Zoning Regulations, Section 3450.

3. City of Oakland, Oakland Policy Plan, A Component of the Oakland Comprehensive Plan, October 24, 1972, amended September, 1980.
4. The five-digit number following goals and policies indicates the City Council resolution within which the particular goal or policy was adopted.

4.2 SOILS AND GEOLOGY

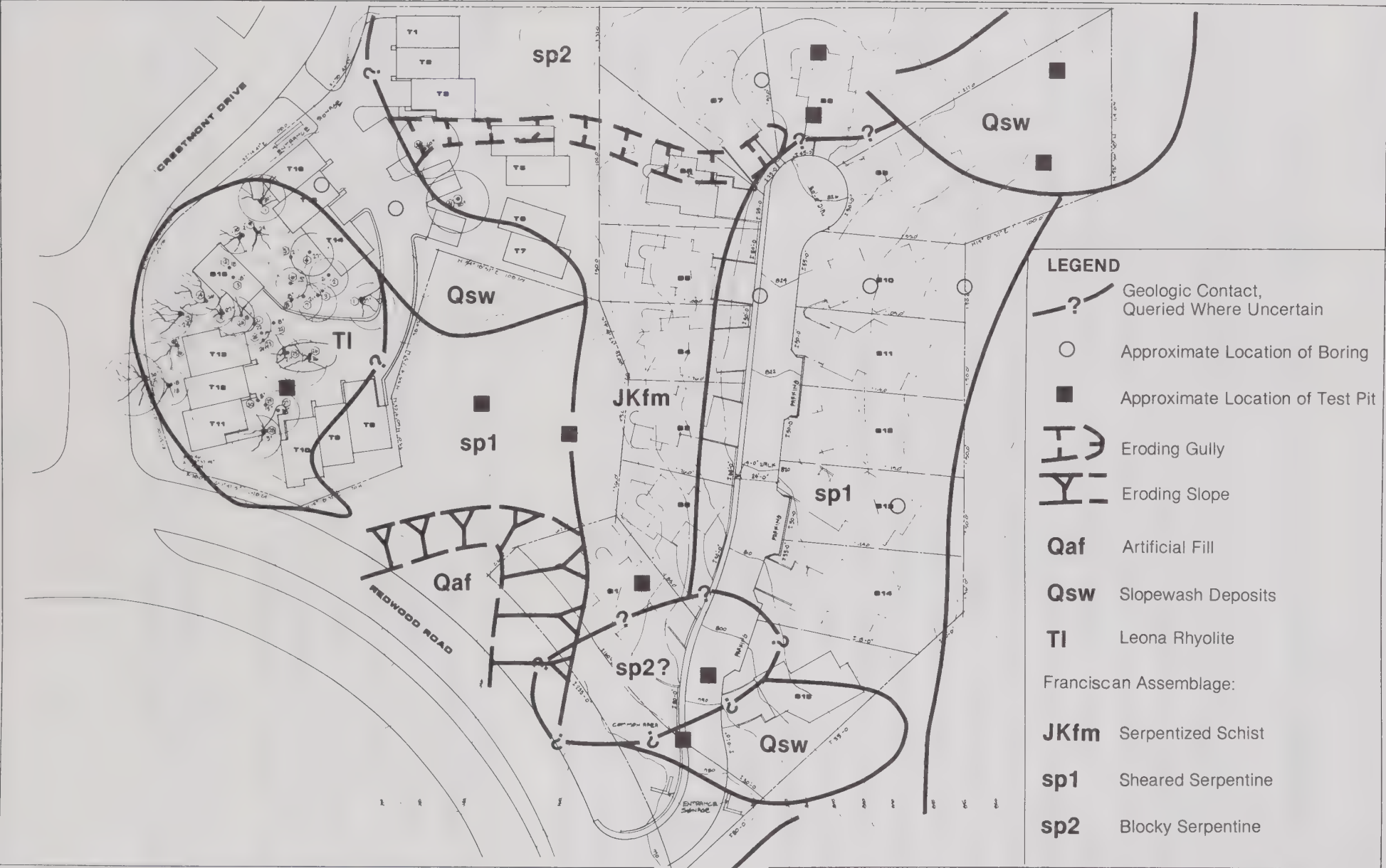
SETTING

The proposed project site is located within northern California's Coast Ranges Geomorphic Province. Regional folding and faulting in the Province has deformed rock formations and produced valleys and ridges aligned predominantly towards the northwest. The Berkeley, Oakland and San Leandro hills are a northward extension of the Diablo Range, a major structural uplift in the central Coast Ranges. Locally known as the Oakland hills, these hills are dissected by numerous small and large drainage swales; a swale is a low-lying or depressed and often wet stretch of land, characterized by soil creep, concentrated runoff and thicker-than-normal soils. The approximately four-acre site generally slopes towards the southwest. Elevations on the site range from approximately 875 ft. Oakland City Datum (OCD)¹ along the northeastern property line to about 725 ft. OCD along the southwestern property line. The site topography is dominated by steep slopes located along the eastern and western property lines, with a horizontal/vertical ratio of about 2:1 (Figures 4.6-2, 4.6-3 and 4.6-4, provide photographic representation of the site topography). The steepness of the slopes on site range from 30 to 55 percent. At the southern end of the site (nearest the Redwood Road/Crestmont Drive intersection), a densely wooded knoll rises from about 725 ft. OCD to about 750 ft. OCD. Near the northern portion of the site an east-to-west trending swale containing several large boulders is present; this swale exits the site at approximately 800 ft. OCD. A relatively shallow erosional gully is present approximately 80 ft. southeast of the northwestern property line, running in a northeast-southwest direction.

A site-specific geotechnical study was prepared for the proposed project and is summarized below.² The study indicates that three distinct areas of soil composition are present on the site (see Figure 4.2-1, page 4.2-2). The northeast half of the site (underlain by schist and serpentine bedrock, as described below) contains one to three feet of sandy clay and clayey sand soils. The swale on the south side of the site contains one to five feet of sandy and gravelly fill overlying about two feet of native clayey sand. To the north and northwest of the knoll, four to eight feet of stiff to very stiff sandy clay overlies serpentine bedrock.

Except for the southern portion of the project site (the knoll area), the site is located within an outcrop belt of Franciscan serpentine bedrock. This type of bedrock is fairly complex, consisting of

4.2-2



SOURCE: ALAN KROPP & ASSOCIATES; EIP ASSOCIATES 1988

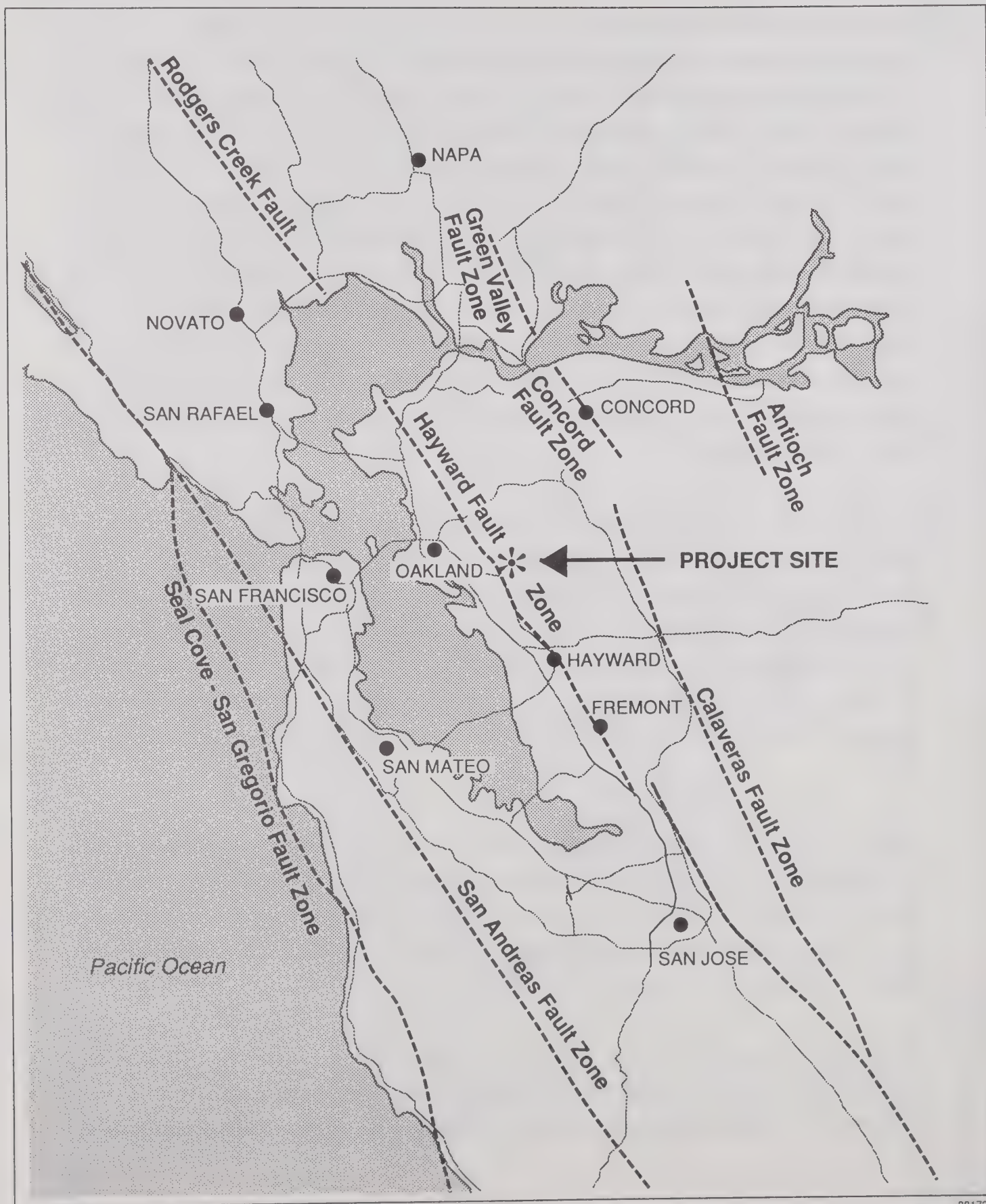


folded, faulted and altered sedimentary rocks (sandstone, shale, chert, schist) that have been intruded by igneous rocks (gabbro, serpentine) and covered by lava flows (rhyolite, basalt).³ Of these rock types, serpentine, serpentine schist, and rhyolite are present on site. The northwestern, northern and northeastern slopes of the site are formed in serpentine, serpentinized schist, blocky serpentine, and sheared serpentine, respectively. The areas above and below the slope consist of schist. The knoll portion of the site is rhyolite, separated from the schist by sheared (weak) serpentine. The sheared serpentine is soft, foliated, fractured and slide-prone (see Impact 4.2-2). Grading in the sheared serpentine has created slope stability problems elsewhere, for example, in cuts overlooking Redwood Road. The massive (blocky) serpentine is very dense, coherent rock that is not slide-prone. The rhyolite is deeply weathered, containing loose fragments in a clay matrix, but slope stability and foundation conditions are good. Slope stability and foundation conditions in the rhyolite also are good; however, debris slides have occurred where the rock is excessively fractured or weathered, as well as in the overlying soils.⁴

The soil at the site is classified as Montara-Clay Loam by the U.S. Department of Agriculture Soil Conservation Service. The Montara Clay Loam is shallow, moderately slowly permeable, excessively drained, and has a high to very high erosion hazard rating. The soil is also moderately alkaline, has a moderate shrink/swell potential, and presents severe constraints for all types of development due to the steepness of slopes, the shallow soil depth, and the underlying hard bedrock near the surface (see Impact 4.2-2).⁵ Minor soil instability in the form of cracking from shrink/swell reaction, and downslope soil creep (slow landsliding), were observed on the slopes in the northern corner of the site.⁶

Free groundwater within 48 ft. of the ground surface was not observed in any test borings at the time of drilling (July 1987). Bedrock was encountered everywhere on site within seven feet of the ground surface; it was therefore concluded that occurrences of subsurface water would only be related to storm events, and could be controlled by design features such as drainage berms, interceptor ditches, shaped terraces and "V"-ditches, or similar facilities.²

The project site, as part of the Bay Area, is in a region of high seismic activity. The Bay Area annually experiences low-to-moderate magnitude earthquakes along several historically active major fault zones, and is subject to ground shaking from potentially large earthquakes on the Hayward and



SOURCE: CALIFORNIA DIVISION OF MINING AND GEOLOGY/JENNINGS; EIP ASSOCIATES

MILES 0 5 10



San Andreas faults, as well as on other faults in the region (Figure 4.2-2). In the aftermath of the 1971 San Fernando earthquake, the California Legislature enacted the Alquist-Priolo Special Studies Zone Act.⁷ This act required the State Geologist to define Special Studies Zones along all earthquake faults that were known to be active and sufficiently well defined. The nearest trace of an active fault system within an Alquist-Priolo Special Studies Zone is the Hayward fault about 0.5 miles southwest of the site (see Figure 4.2-2A, page 4.2-6).⁸ Other major fault zones include the San Andreas fault (about 20 miles southwest) and the Calaveras fault (about nine miles northeast). The Hayward and Calaveras faults are considered capable of generating earthquakes of Richter Scale Magnitude (M) 7.5. The San Andreas fault could generate a Richter Scale M8.3 earthquake.⁹

There are no known active faults transversing the project site, and the site is near, but not within, an Alquist-Priolo Special Studies Zone. During the landslide investigation (Appendix C of the geotechnical report, which is Appendix B of this EIR) an ancient fault was indicated on the site. The fault forms the contact between two different types of rocks, Franciscan serpentine and Leona ryolite. Because the fault is not related to the Hayward fault or any other known active fault and because it shows no evidence of movement for the past 5 million years, this feature is not considered to be a seismic threat to site development.¹⁰ However, drainage and foundation stability in the area of soft serpentine along the contact would need special attention in the grading design.

Estimating the maximum credible ground acceleration from earthquakes is important for the design of buildings to ensure that they are designed to withstand the shaking. The severity of expected seismically induced groundshaking is related to the distance from the epicenter of the earthquake and to the type of bedrock of surface deposits in a study area.

In the event of a major earthquake along active faults in the Bay Area, the project site may be subjected to very violent groundshaking.¹¹ In a maximum credible earthquake, the site would experience ground acceleration in excess of 0.5g.^{12,13}

The groundshaking effects of 0.5g acceleration are predicted to be equivalent to Intensity IX or higher on the Modified Mercalli Scale.



IMPACTS AND MITIGATION MEASURES

Standards of Significance

The examination of soils, geologic and seismic issues in this EIR is based on information obtained from on-site geotechnical investigation and observation, laboratory analysis of collected materials through review of existing literature, and from consultation with persons involved with or concerned about the proposed project. Section 15382 of the CEQA Guidelines defines a significant effect on the geologic environment as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project."¹⁴ Section 15126(a) of the Guidelines stipulates that an EIR analyze "significant environmental effects the project might cause by bringing development or people into the area affected." Thus, the analysis of potential impacts is based on the following criteria: would implementation of the proposed project expose people to unmitigated geologic hazards caused by seismic groundshaking and/or seismically induced landslides.

The project as proposed would not affect the area's geology except for disturbance of the underlying bedrock for foundation and road construction. The geotechnical report states that the proposed project would be feasible, provided all of its design recommendations were incorporated in the construction of the project.

Seismic Hazards

The most recently published geologic map of this area (Radbruch, 1974) indicates that a trace of an ancient fault occurs on the site, but shows no evidence of historical activity. The fault is not mapped in Special Studies Zones by the California Division of Mines and Geology, consequently, it is not considered a surface faulting hazard and is not considered a significant impact.

The effects on the project could include damage to foundations and underground pipes, shifting of structures off their foundations, and the overturning of heavy furniture.

Impact

- 4.2-1 The project would add 32 housing units and households to a seismically active area, thereby attracting additional population to an area exposed to earthquake hazards.**

The effects of groundshaking can be reduced to a great extent through properly applied engineering design, but cannot be entirely eliminated. The City General Plan requires the use of the current Uniform Building Code standards for all new structures. Additionally, the Plan requires appropriate site investigation of geologic conditions, and the incorporation of structural design elements to account for those conditions. All proposed site modifications, structures, roads, and utilities must be completed in accordance with the recommendations of California-licensed engineering professionals.

New buildings are subject to more stringent building and structural standards than older buildings. Therefore, persons living in new buildings would be relatively safer than those in some older existing buildings. However, during an earthquake, glass, and in some cases building cladding, is expected to endanger those on the streets and sidewalks. The bridges leading to and from Oakland are expected to be closed for over three days due to damaged access ramps. The same would be true of freeways traversing the East San Francisco Bay. Power outages would also likely occur for at least one or two days.

A moderate earthquake with a Richter magnitude of 7.1 occurred in the Bay Area in October 1989. The epicenter of that earthquake, known as the Loma Prieta earthquake, was about 45 miles from the project site. A number of buildings collapsed or were jolted off their foundations, mostly near the epicenter area but also in other parts of the Bay Area, including Oakland and San Francisco. The single largest cause of deaths was due to the collapse of the two-tiered freeway structure, known as the Cypress Structure, in Oakland. The Cypress Structure has since been demolished. Liquefaction and ground settlement occurred in places farther from the epicenter (primarily, for example, in the Marina and South of Market districts of San Francisco) and at the Oakland International Airport.

The type of damage caused by the 1989 earthquake is typical of moderate-sized earthquakes. Damage that occurred at distances of up to 50 miles from the epicenter is evidence that the project area may be adversely affected by earthquakes occurring on any of the region's major faults. An earthquake of similar or larger magnitude could occur again on the San Andreas, Hayward, Calaveras or other Bay Area faults.

Mitigation Measure

- 4.2-1 As part of the proposed project, the structures would be designed using the Uniform Building Code standards for UBC Seismic Zone 4, the zone in which the project site is located, as minimum standards of performance.

Grading and Foundations

Impact

- 4.2-2 **Grading activities on hillside sites have the potential to reactivate existing slope instabilities by undercutting the support of upslope materials. The placement of fill could overload the ability of slopes to support the weight of upslope material. Additionally, landscape irrigation could saturate soils in filled areas, contributing to slope instability.**

Grading throughout the project site would be necessary to establish sound supports for the foundations of new structures and roads, and slope stabilization (see Figure 4.2-3, page 4.2-10). Approximately 8,000 cubic yards of material would be cut. Most of the material would come from the upper portion of the site, but every parcel would be cut to some extent. About 4,000 cubic yards of the cut material would be used on-site as fill, again mostly in the upper portion of the site, producing a net export of about 4,000 cubic yards.¹⁵

A hillside fill supported by 4- to 13-foot high retaining walls would be needed for the access from Redwood Road. Access from Crestmont Drive is in an area subject to erosion and underlain by sheared serpentine, which generally has poor slope stability conditions. The geotechnical report indicates that all of the placement of buildings are in stable areas; however, the report cautions that all geotechnical recommendations should be followed carefully to minimize the likelihood of these areas becoming unstable.

The geotechnical report identifies the following potential site constraints:

- Poor slope stability in areas underlain with sheared serpentine;
- Slope wash deposits, soil creep, and concentrated runoff in the swale area;
- Erosion in the gully area.

CONCEPTUAL GRADING PLAN

FIGURE 4.2-3



SOURCE: COLLABORATIVE DESIGN ARCHITECTS / EIP ASSOCIATES, 1988

An analysis of the geotechnical site plan (Figure 4.2-1), shows that the following 24 proposed units appear to fall at least partially in areas where the above geotechnical site constraints would adversely effect grading and foundation work for the proposed housing units.

<u>Geotechnical Site Constraints</u>	<u>Affected Housing Units</u>
● Sheared serpentinite (poor slope stability)	S2 through S15; T8 through T10
● Swale Area (slope wash deposits, soil creep, and concentrated runoff)	S8; S9; S15; T6, T7, T14 through T16
● Gully area (erosion)	S6, S7, T3, T4

Approximately 24 of the 32 proposed units would be at least partially affected by poor slope stability, soil creep, and soil erosion characteristics. Without adequate mitigation, these site constraints would be considered significant adverse impacts because they could result in substantial changes to the existing topography, and they could create geologically hazardous conditions for the future population of the site.

Foundations for residences and retaining walls restraining fill slopes would be drilled, cast-in-place, straight-shaft piers extending eight feet into bedrock, and designed to resist lateral pressures up to 500 pounds per square foot. Constructing the piers would involve drilling vertical holes into the bedrock, placing a cage of steel reinforcing bars in the holes, and filling the holes with concrete. The advantages of this design are that it would anchor the foundations firmly to the bedrock and would provide total support for the structures without the need for pile driving, a technique that creates substantial vibration and noise. Both anchoring and support (whether provided by piers or piles) are necessary on steep building sites to protect the residences and retaining walls from downslope soil movements. Avoiding excess vibration is desirable on steep construction sites to reduce the possibility of creating unstable slope conditions. Hillside fills would need to be buttressed by retaining walls keyed into the bedrock, and drained by surface and subdrainage systems to provide added stability for the building sites.

Based on their investigation, the geotechnical engineer has recommended cast-in-place pier foundations for occupied structures on this site. The system is technically feasible, commonly used and well understood by reputable engineering and contracting firms working in hillside residential

developments. Specifications for the foundation and for lateral pressures on piers and retaining walls have been reviewed independently and found appropriate for the site. It has been determined by the project sponsor's engineer that the proposed site development would not have an adverse affect on the overall stability of the hillside if the geotechnical recommendations are followed.¹⁶

The environmental consultant concurs with the geotechnical engineer that the probability of future landsliding at the developed site will be substantially reduced by the use of properly constructed, drained and maintained foundations and retaining walls. It must be recognized that it becomes the responsibility of the occupants of hillside sites to perform the maintenance of drainage systems that is so important to the proper functioning of foundations and retaining walls. Even if proper maintenance is performed, it is possible that breaks in water lines, very heavy rains, or other severe environmental conditions may cause landsliding. Because the consequences of such landsliding, however low the probability of occurrence, could be costly, the occupants of the site should consider obtaining landslide insurance.

Grading activities also have the potential to generate substantial amounts of loose soil and rock during the clearing and excavation phases of the construction period (in this case, about 8,000 cubic yards of material). These disrupted soils and earth materials on the site would be exposed to wind and water erosion, particularly if such work continued into the rainy season. The disrupted materials carried from the site by stormwater runoff, by washwater runoff, by dewatering discharge, or by excess water used for dust control, could contribute to sedimentation in the City's storm drain system, and could be transported from the construction site into receiving waters. Wind-borne dust carried from the site could contribute to localized air pollution. Without mitigation, these potential impacts would be considered significant under CEQA. An erosion and sediment transport control plan would be necessary to avoid these occurrences (see Section 4.3, Drainage).

City Policies

The project site is located in Ground Response Zone IV and Landslide Potential Zone III as described in the Environmental Hazards Element of the Oakland Comprehensive Plan.¹⁷ Ground Response Zone IV would experience significant amplification of seismic waves. Although it may not experience any discernable amplification of seismic waves, Landslide Potential Zone III is the most susceptible to landsliding. The combination of severe ground motion, significant wave amplification in bedrock and potential landslide susceptibility indicates that seismically induced landsliding is a

factor to be considered in grading, foundation and structural design. The risk of seismically induced landsliding potential can be reduced to an acceptable level through application of appropriate grading and foundation practices, and of associated structural specifications as recommended in Mitigation Measure 4.2-2.

Mitigation Measures

- 4.2-2 Excavation pit walls would be protected so that slumping of loose material into the pits would not occur. The contractor would comply with the Excavation Standards of the Occupational Safety and Health Agency (OSHA).

Whenever possible, excavation and construction would take place during the dry season. This is the single most effective means of avoiding the potential erosion impacts of stormwater runoff entering the excavation. If winter excavation is necessary, an Erosion and Sediment Transport Control Plan would be implemented. Detailed closure procedures would be specified and completed prior to the rainy season (about October 1) of each year (see Section 4.3, Drainage).

The foundations and retaining walls would be designed to withstand lateral pressure below the ground surface to prevent soil creep to the extent possible.

To ensure the seismic integrity of the proposed project, a seismic analysis should be prepared. Based on the results of the analysis, the buildings would be designed to withstand the expected groundshaking the study indicated would occur at the site in the event of a major earthquake. The designs are required by the Uniform Building Code.

Nonstructural elements of the buildings, such as hanging light fixtures, hung ceilings, wall partitions, and mechanical equipment should be attached firmly to reduce the likelihood of their falling during an earthquake.

Because the consequences of landsliding could be costly, the occupants of the site should consider obtaining landslide insurance.

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1. Oakland City Datum is 2.998 feet above mean sea level.
 2. Alan Kropp & Associates, Geotechnical Consultants, *Geotechnical Investigation, Oakcrest Homes, Oakland California*, August 19, 1988. The full text of this report is included as Appendix B of this EIR.
 3. *Rhyolite* is the volcanic equivalent of granite. It typically shows flow structures and inclusions of crystals and other rocks in a fine grained matrix. The Leona rhyolite is light gray to greenish-gray and weathers to yellow-orange and red-orange because of the high iron content.

Serpentine comprises a group of minerals formed deep within the earth as hydrous magnesium (or iron) silicate, derived from the alteration of magnesium-rich minerals (such as olivine), and found in both igneous and metamorphic rocks. In the Franciscan assemblage, serpentine commonly is green to grayish green in color with veins of white. It occurs as sheared, weak, easily eroded rock and as hard, blocky, massive, competent rock. It also occurs as an alteration in schist.

Schist is a general term for a group of strongly foliated crystalline rocks, formed by dynamic metamorphism. The rocks can be split into thin flakes or slabs along well-developed planes. The mineral composition varies considerably. In the Franciscan assemblage, schist is derived from sandstones, siltstones, and greenstones. Although it is sheared and fractured, and contains varying amounts of serpentine, it often forms a dense competent rock mass. Colors range from yellowish-brown through grey to greyish-blue.

4. Darwin Myers Associates, *Landslide Hazard Investigation, Oakcrest Planned Unit Development, Redwood Road Area, Oakland, California*, August 8, 1988. This report is contained in the Geotechnical Investigation report (see endnote No. 2) as Appendix C.
5. L.E. Welch, *Soil Survey of Alameda County, California Western Part*, Soil Conservation Service, U.S. Department of Agriculture, 1981.
6. Site observation by EIP Associates geologist, November 2, 1987.
7. The State of California has delineated special studies zones (entitled Alquist-Priolo Special Studies Zones after the legislators who wrote the act) around active and potentially active faults in the state. The zones extend 660 ft. on either side of identified fault traces. No structures for human occupancy may be built across an identified active fault trace. An area of 50 feet on either side of an active fault trace is assumed to be underlain by the fault, unless proven otherwise. Proposed construction within the Special Studies Zone can take place only following the completion of a geological report prepared by a California Registered Geologist.
8. J. L. Davis, State Geologist, *State of California Special Studies Zones Map, Oakland East*, delineated in compliance with the Alquist-Priolo Special Studies Zone Act., January 1, 1982.
9. R.W. Greensfelder, *Maximum Credible Rock Acceleration From Earthquakes in California*, California Division of Mines and Geology Map Sheet 23, scale 1:2,500,000, 1984.
10. Alan Kropp & Associates, 1988, op.cit.
11. R.D. Borchardt, et al, *Maximum Earthquake Intensity Predicted for Large Earthquakes, Southern San Francisco Bay Region*, U.S. Geological Survey Map MF-709, 1975, scale 1:125,000, Sheet 2.
12. "g" equals the acceleration of gravity.
13. Don Hillebrandt Associates, Geotechnical Consultants, *Geotechnical Investigation, Proposed Additions to Oakland Hills Tennis Club*, DHA Project No. 1772-1, August 12, 1987.
14. Office of Planning and Research, *CEQA: The California Environmental Quality Act, Statutes and Guidelines, 1986*, revised June 1986.
15. Telephone conversation, E. Morand, P.E., Morand Engineering, April 14, 1992.

16. Telephone conversation, E. Morand, P.E., Morand Engineering, April 14, 1992.
17. City of Oakland, *Environmental Hazards, An Element of the Oakland Comprehensive Plan*, Oakland, California Figures 5 and 6, 1974.

4.3 DRAINAGE

SETTING

No water bodies, springs, or permanent water courses are located on the proposed project site. The natural site drainage is southwest onto Crestmont Drive and Redwood Road. Runoff from Crestmont Drive drains onto Redwood Road. Runoff from Redwood Road is directed to the City storm drainage system, which has limited openings to underground conduits in the Oakland hills.¹ Water typically flows along City streets (such as Redwood Road), which are part of the storm-water collection and drainage system, until inlets to the underground portions of the system are encountered. The system collects water throughout the City, routes it through streets, culverts, pipes, etc., and delivers it to outfalls located, primarily, in San Francisco Bay and, to a lesser extent, in Lake Merritt.²

The project area receives about 24 inches of rainfall in an average year, most of it during the November-to-April rainy season.³ Depth to groundwater is not known, however, it is known that the groundwater level is below the 48-foot depth of the test borings drilled for the geotechnical investigation. No aquifers that would be interrupted by the project construction were detected on the site.⁴

IMPACTS AND MITIGATION MEASURES

The examination of drainage issues in this EIR is based on information obtained from site observation, from the review of site-specific studies and similar studies for other property in the area, and from personal communications with persons involved with or concerned about the proposed project, as referenced at the end of this section.

Standard of Significance

The basic criteria applied to the analysis of impacts is whether or not implementation of the development plan, as proposed, would lend to unmitigated hazards caused by project-related storm water runoff, or cause substantial deterioration of the quality of groundwater or surface waters in the vicinity of the site.

Impact

- 4.3-1 **The volume of storm-water runoff leaving the site would increase by as much as one cubic foot per second, following construction of the proposed project.**

The proposed project would increase the impervious surfaces of the site by about 50 percent. These surfaces include the building, parking and access road areas. The runoff factors from such surfaces generally are 75-95 percent. In its existing state, the site's runoff factor is already in the range of 75-95 percent because of the steep slopes and shallow depth of soil overlying the nearly impervious bedrock.⁵ The speed and volume of the site runoff generated after completion of the project would most likely be in the upper end of this range.

The difference in the lower and upper ends of the range of rates at which storm-water runoff would leave the site is shown in the following conservative example. During a 35-year storm lasting about 30 minutes, approximately 0.61 inch of rain would fall on the four-acre site. At the lower runoff factor (75%), an average of about 3.7 cubic feet of water would leave the site each second (cfs). At the higher runoff factor (95%), this volume would be about 4.7 cfs. The increase is about 27 percent over existing conditions, although the actual volumetric difference is only one cubic foot per second, which poses no storm drain capacity problems.⁶

Runoff from the proposed development would continue to flow to the City's storm-drainage line along Redwood Road. Considering the steepness of the grade in the system at this point (varying between 10 and 15 percent), there is little likelihood that any capacity problems would occur locally. Additional storm water from the property reaching the lower parts of the storm drain system (in the flatlands), are not expected to affect system capacity because of the very low volume of water (1 cfs) involved.⁷ Prior to final site plan approval, the project sponsor's engineer would evaluate the plan to confirm that there would be no downstream incapacities as a result of this project. That evaluation would be reviewed by the City of Oakland Office of Public Works (OPW).

The increase of as much as one cfs of storm-water runoff created by the project is not considered a significant impact because the actual volume of the increase is too small to be measured on a system-wide basis. However, because every cfs increases the cumulative volume the system must carry, OPW takes a conservative approach to each potential addition of water to the storm drainage system. When a Tentative Map is submitted for City Planning Department review, it is reviewed by OPW

engineers to assess the capability of the City's system to accommodate the increased volume and speed of any additional runoff generated by the proposed project.

Mitigation

- 4.3-1 To reduce the cumulative impact associated with the limited volume of additional runoff, the project sponsor's civil engineer shall prepare a Site Drainage Plan, including the predicted additional flow; and outlining the capacity, peak flow and tie-in with the City storm-drain system. The plan would be subject to approval by the Oakland Office of Public Works. If the project drainage is determined to create capacity problems for the City system, the project sponsor would be responsible for eliminating the impact of the project on the system. The project sponsor may be requested to provide on-site detention or payment of an in-lieu fee to the City Office of Public Works.

Impact

- 4.3-2 **Construction activities at the site of the proposed project could increase the erosion of soils on, or down slope from, the site, thus increasing sediment load and decreasing water quality.**

Grading, clearing and excavation activities have the potential to generate substantial amounts of loose soil and rock during the early phases of construction. In portions of the site adjacent to drainage ways, storm-water runoff, wash-water runoff, or excess water used for dust control could transport disrupted earth materials from the construction site, or erode soil from adjacent sites, and transport it into receiving waters. Water leaving the construction site could carry soil or pollutants to the City storm-drain system and eventually to the Bay. The addition of sediment to the storm-drain system could reduce its water-carrying capacity and could contribute to local flooding and more erosion. The addition of construction-related pollutants (oil, grease, paint) would be detrimental to the quality of water in the drainage system and, ultimately, to the water quality of the Bay.

Without mitigation, this potential impact would be significant for two reasons: it could result in substantial turbidity in the receiving waters, thereby reducing the viability of the habitat; and/or it could create flood hazard conditions for the population of areas downstream by partially blocking the flow of storm-water runoff.

Mitigation

- 4.3-2 To reduce the potential for erosion and sediment transport from the site, the project sponsor's civil engineer shall prepare a comprehensive, staged Erosion and Sediment Transport Control Plan that would cover temporary control measures for the construction period and permanent control measures to apply during the useful lifetime of the project.⁸ The plan would be subject to approval by the City of Oakland Office of Public Works, which is responsible for the drainage system, and the Alameda County Flood Control and Water Conservation District, which is responsible for maintaining the channels through which drainage is delivered to the Bay. Mass grading would be confined to the dry season. Detailed closure procedures would be specified and completed prior to the beginning of the rainy season (about October 1) of each year. Maintenance standards and responsibilities for all erosion control measures must be delineated clearly.

Implementation of an erosion and sediment transport plan would reduce the potential impact of soil loss to a less-than-significant level. The erosion and sediment transport plan shall be designed and implemented by the project engineer during the permitting phase of the proposed project. The specific language of such plans varies, depending on the specific characteristics of the site. However, the concepts to be included are listed below.⁹

- Confine grading to the dry season.
- Protect vegetation along the hillsides between the project development areas and Redwood Road.
- Discharge project runoff at frequent intervals to avoid buildup of large, potentially erosive flows.
- Keep disturbed areas to a minimum.
- Stabilize disturbed areas as quickly as possible, either by vegetative or mechanical methods.
- Direct runoff away from disturbed areas during construction.
- Trap sediment before it leaves the site with such techniques as check dams, sediment ponds or siltation fences.
- Design developed area to increase the time of concentration through grading, detention areas, energy dissipators and moderate flow velocities.
- Install and maintain permanent erosion control systems to operate during the expected lifetime of the project.

Impact**4.3-3 Project operation could result in cumulative deterioration of the downstream quality of storm-water runoff.**

The major contributor of contaminants to urban runoff is primarily from the streets and gutters and other impervious areas directly connected to streets or storm drains. Between rainstorms materials accumulate on these surfaces in a variety of ways, for example, debris dropped or scattered by individuals; sidewalk sweepings; debris and other particulate matter washed into streets from yards and other unpaved areas; wastes and dirt from construction, renovation, and demolition; fecal droppings from dogs, birds, and other animals; remnants of household refuse dropped during collection or scattered by animals or wind; dirt, oil, tire and exhaust residue contributed by automobiles; and fallout of air-borne particles. Solids in the water contaminant load build up most rapidly during the first 48 to 72 hours after a major rainfall. In a residential area, this build-up can amount to about 500 pounds of solids per mile of curb by the end of the third day. Accumulation rates decrease with time; total accumulation reaches about 750 pounds per curb mile after two weeks.¹⁰

Without mitigation, this accumulation of urban pollutants would be a significant cumulative impact because, by contributing to the deterioration of the quality of storm-water runoff, the eventual result would be the deterioration of water quality and habitat of the Bay.

Mitigation**4.3-3 The CC&R for the PUD should stipulate that a regular and frequent program of vacuum sweeping of the on-site drives and parking areas shall be implemented and maintained to reduce the buildup of contaminants on paved surfaces.**

In conjunction with the previously listed mitigation measures, this program would reduce the cumulative impact on the quality of storm-water runoff to a less-than-significant level. Although additional noise and minor traffic congestion could result from this mitigation measure, the vacuuming could be accomplished during the mid-morning and early afternoon, when the least number of persons would be affected. Additionally, the vacuuming would follow a posted schedule, so all residents would be aware of when it was to happen.

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1. Telephone conversation, Ken Wong, Supervising Engineer, Department of Public Works Maintenance Service Division, January, 7, 1992.
 2. Telephone conversation, Jack Wong, Supervising Engineer, Department of Public Works, Maintenance Service Division, January 8, 1992.
 3. S.E. Rantz, *Precipitation Depth-Duration-Frequency Relations for the San Francisco Bay Region*, U.S. Geological Survey Professional Paper 750-C, 1977.
 4. Alan Kropp & Associates, Geotechnical Consultants (AKA), *Geotechnical Investigation, Oakcrest Homes, Oakland California*, AKA Project No. 1025, L1129, August 19, 1987.
 5. Chow, V.T., "Runoff", Section 14 in *Handbook of Applied Hydrology*, McGraw-Hill, San Francisco, 1964, 54 pages.
 6. W. Boyd, Oakland Office of Public Works, Supervising Civil Engineer, telephone communication, November 8, 1988.
 7. W. Boyd, Oakland Office of Public Works, Supervising Civil Engineer, telephone communication, November 8, 1988.
 8. Required by Oakland Municipal Code: Chapter 2; Article 6, Grading, Excavations and Fills; Section 2-6.073, Permit Application -- Erosion and Sedimentation Control Plans.
 9. Association of Bay Area Governments (ABAG), *Manual of Standards for Erosion and Sedimentation Control Measures*, Berkeley, California, June 1981.
 10. L. A. Roesner, "Quality of Urban Runoff" in *Urban Stormwater Hydrology*, Water Resources Monograph 7, D. F. Kibler, editor, American Geophysical Union, Washington, D. C., 1982.

4.4 VEGETATION AND WILDLIFE

SETTING

Vegetation

A biotic survey was conducted for the entire project and plant species and plant communities existing on the site were inventoried.¹ The site supports four native plant communities: coast live oak woodland, coastal sage scrub, annual grassland, and serpentine grassland.

Coast live oak woodland is dominated by coast live oak (*Quercus agrifolia*) and California-bay (*Umbellularia californica*), and is located in the southwest and northwest portions of the site. The shrub understory is not well developed, consisting of straggly gooseberries (*Ribes divaricatum*), toyon (*Heteromeles arbutifolia*), and coyote brush (*Baccharis pilularis* var. *consanguinea*). The common vine, twinberry (*Lonicera hispidula*), grows among the trees and shrubs. Herbaceous species include miner's lettuce (*Montia perfoliata*), hedge-nettle (*Stachys rigida* var. *quercetorum*), manroot (*Marah fabaceus*), and goldback fern (*Pityrogramma triangularis*).

The project sponsor has prepared a tree survey for the lower portion of the site and EIP Associates has identified and measured additional trees on the remaining portions. These surveys are the basis for preparing the project's landscape plans and analyzing impacts to trees on the site. The largest oaks grow in the southwest portion of the site. Most consist of single-trunked trees measuring up to 24 inches in diameter, and are estimated to be 75 to 100 years old. The oaks and bays on the northwest corner of the site are primarily multi-trunked trees, indicating that they have been burned or cut in the past. The basal diameters of the bays ranged from 26 to 34 inches; basal diameters of the oaks were 19 inches or less.

The City of Oakland has a Tree Removal Ordinance which requires a Tree Removal Permit for the removal of any coast live oak trees having a trunk diameter at breast height of four inches or greater, or any pine or acacia trees having a trunk diameter of nine inches or greater; removal of eucalyptus trees does not require such a permit.

Some oak woodlands, primarily valley oak woodlands, are considered sensitive habitats by the California Department of Fish and Game (CDFG).² Valley oak woodland has the highest ranking possible, indicating that it is both rare and endangered throughout its range. Coast live oak

woodlands, however, have a very low ranking, which indicates that it is apparently secure both globally and locally. No valley oaks occur on or near the site.

A small woodland of Monterey pine and acacia is located on the southeast portion of the site. The Monterey pines, while native to California, were planted on this site, as were the acacias. Trunk diameters of the acacias ranged from 4.3 inches to 14 inches; diameters for the pines ranged from 7.5 inches to 24.9 inches.

Coastal sage scrub is a shrub-dominated community common to hot, dry slopes with thin soil, where insufficient moisture precludes the growth of trees. Coastal sage scrub on the site is not well developed and consists of a California sagebrush (*Artemisia californica*), sticky monkeyflower (*Mimulus aurantiacus*), deerweed (*Lotus scoparius*), coyote brush, yerba santa (*Eriodictyon* sp.), golden yarrow (*Eriophyllum confertiflorum*), paintbrush (*Castilleja* sp.), and others. Grasses, such as needlegrass (*Stipa* sp.) and wild oats (*Avena* sp.) grow among the shrubs.

Annual grassland on the site is dominated by annual grasses including wild oats, ryegrass, foxtail, (*Hordeum* sp.), and brome grass (*Bromus* sp.). Broadleaved species, such as dwarf plantain (*Plantago erecta*), blue-eyed grass (*Sisyrinchium bellum*), and lupine (*Lupinus* sp.), among others are common. These areas are dominated by introduced annual species of grasses and are sometimes referred to as non-native grasslands. They are particularly common on heavily used or disturbed sites.

Serpentine grassland on the site is similar to the annual grassland that occurs there, but native needlegrass is usually the dominant grass species present. The serpentine outcrops on the site have little or no soil associated with them.

Serpentines are a group of silicate minerals formed through the alteration of other minerals. Rocks formed primarily from serpentine minerals are known as serpentinite and, because of the chemical composition of the minerals, are often called ultrabasic rocks (see also Chapter 4.2, Soils and Geology, for additional information).

Soils derived from serpentinite are rich in magnesium, iron, and nickel, but are very low in calcium. Two elements used in relatively large quantities by plants, nitrogen and phosphorous, are also usually present in low quantities. Because of the stress caused by this imbalance, serpentine soils support

vegetation and plant communities different from those on surrounding soils and can, in extreme cases, be devoid of vegetation altogether.³ Serpentine soils also support some of the rarest plant and wildlife habitat in California. Since serpentine soils support a special vegetation and many rare species, the Natural Heritage Division of the CDFG considers many serpentine areas to be significant habitat (See the discussion of sensitive species, below).

In 1981, in order to better understand California's biological diversity and to help slow its loss, the State Legislature passed Assembly Bill 1039 which provided for the establishment of a Significant Natural Areas Program that is now part of the California Fish and Game Code.⁴ Under this legislation, the CDFG is required to: 1) develop and maintain a data management system for natural resources; 2) identify the most significant natural areas of the state; 3) ensure the recognition of these areas; 4) seek the long-term protection of these areas; and 5) provide coordinating services for other public and private conservation organizations interested in protecting natural areas.

There are a number of criteria for determining if a site is suitable for becoming a Significant Natural Area; the goal is to preserve as much diversity within a given area as possible.⁵ Areas with sensitive habitat and sensitive species, and that are relatively undisturbed, are highly considered, while areas with little habitat, no sensitive species, and a high level of disturbance, do not receive the same level of consideration. Due to the relatively small area present, its relatively high level of disturbance, and the absence of any sensitive plant species, it is unlikely that the proposed project site would be eligible for preservation as a Significant Natural Area.

At one time, serpentine grassland was more common in the Oakland/Berkeley hills; much of this habitat has been lost to urban development. Any development on this site would contribute to the continuing loss of this type of habitat.

Wildlife

The proposed project site and surrounding area supports a variety of native wildlife. Tracks and other signs of deer, rabbits, squirrels and gophers were found on the project site. Fox, skunks, raccoons, opossum and other mammals are also known to frequent the Oakland hills area. Birds in the area include dove, quail, brown towhee, scrub jay and Steller's jay, common bushtit, Anna's hummingbird, and wrentit. Red-tailed hawk and turkey vulture are frequently seen flying overhead.

Most likely reptiles and amphibians in the area include California slender salamander, ensatina, California newt, common garter snake, western fence lizard, and northern alligator lizard.

Many of the animal species on the site are likely to use more than one of the plant communities present. Quail and dove may use the grassland for feeding and the woodland and coastal scrub for shelter. However, other species, such as the California newt, would be confined to the moister woodlands of the site.

Sensitive Plant and Animal Species

For the purposes of this EIR, a plant or animal is considered a sensitive species if it fits into one or more of the following categories:

- If it is listed as Endangered (E) or Threatened (T) according to the provisions of Section 4 of the Federal Endangered Species Act (FESA).⁶ The U. S. Fish and Wildlife Service (USFWS) administers the federal act.
- If it is listed as Endangered (E), Threatened (T), or Rare (R) according to the California Endangered Species Act (CESA).⁷ The California Department of Fish and Game (CDFG) administers the State act.
- If it is a candidate for federal listing (C2) or state listing (C). While not protected by either FESA or CESA, it is the policy of some state and federal agencies to manage these species in order to prevent them from becoming listed.
- If it is considered by the CDFG to be a species of special concern (CSC).⁸ CDFG often requests that these animal species be considered in the impact section of environmental documents.
- If it is a plant species that occurs in the California Native Plant Society (CNPS) Inventory.⁹ Some state and federal agencies request that CNPS List 1 and List 2 plants be considered in the impact section. For instance, CDFG often asks that CNPS List 1B species be included in rare plant surveys. Less frequently, an agency may request the inclusion of plants on the CNPS List 3 and List 4.
- If it is considered rare, threatened, or endangered under Section 15380(d) of the California Environmental Quality Act (CEQA) Guidelines.¹⁰ This section states "A species not included in any listing identified in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b)." Thus, according to CEQA, a species may be considered endangered if its survival is in jeopardy due to loss or change of habitat (CEQA Guidelines Section 15380(b)(1)).

By so defining sensitive species, confusion over the term "rare and endangered" is avoided since, for the purposes of this EIR, the terms "rare," "threatened," and "endangered" apply only to species listed R, T, or E by FESA or CESA. Sensitive species can be legally protected by FESA, CESA, CEQA, or through policies issued by State or federal agencies. A number of sensitive plant and animal species are known to occur in the Oakland hills and a list of these is given in Appendix C.

With the exception of the Presidio clarkia and the bay checkerspot butterfly, appropriate habitat for the other sensitive species given in Appendix C does not occur on the proposed project site, and those species are therefore unlikely to occur there. The Presidio clarkia and bay checkerspot butterfly are both generally associated with serpentine soils typical of the serpentine grassland in the center of this site.

In 1980, the Presidio clarkia was found on a serpentine outcrop below the East Bay Regional Park Headquarters on Skyline Boulevard. In June 21, 1988, a new population of Presidio clarkia was discovered on the Oakland Hills Tennis Club site.¹¹ At that time, pursuant to guidelines prepared by the CDFG, the serpentine areas of the proposed Oakcrest project site were also surveyed; no Presidio clarkia was found on the site.¹² The entire Oakcrest site was surveyed again on June 7, 1991 for sensitive species, and none were found.¹³

The bay checkerspot butterfly is considered to be extinct in the areas of its historical range, the vicinity of Joaquin Miller Park and the area extending from the Oakland hills to San Leandro, and the chance of finding the species on the Oakcrest project site are negligible. Housing development, the destruction of the butterfly's host plants, and the introduction of non-native plant species are thought to be responsible for the extirpation of the species; this species is therefore unlikely to occur on the project site.¹⁴

IMPACTS AND MITIGATION MEASURES

Vegetation and wildlife impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

Impact

- 4.4-1 **The proposed project would require the removal of up to half of the coast live oak trees present on the site, and could disrupt trees intended for retention.**

Figure 4.4-1 shows the location of existing trees on the project site, and the proposed location of the dwelling units. To accommodate the proposed development, as many as one-half of the existing coast live oak trees would need to be removed. Removal of these trees would require a Tree Removal Permit from the City of Oakland, pursuant to the Tree Removal Ordinance. The project sponsor would be required to obtain this permit when the proposed PUD application receives approval.

Coast live oak trees are sensitive to soil compaction, changes in topography, root damage and altered drainage patterns, which could occur during and after project construction. In addition, extensive pruning of trees intended for retention could be detrimental to the long-term health of those trees.

In Chapter 4.5, Traffic and Circulation, mitigation measures 4.5-5 and 4.5-6 recommend the removal of up to seven additional coast live oak trees, to allow reconfiguration of the lower access road. These measures are necessary for the safe maneuvering of resident and emergency vehicles, and to provide adequate on-site parking for estimated demand. Therefore, the mitigation measures to minimize the environmental impact of the removal and internal traffic circulation would be in conflict for the site plan as currently proposed.

Mitigation Measure

- 4.4-1 A qualified arborist should be retained by the project sponsor to evaluate the current health of the trees to be retained, and determine the extent to which pruning can safely be accomplished. The arborist should also advise the general contractor regarding the extent of tree root structures, and methods to avoid unnecessary damage to those trees intended to be retained.

A landscape plan shall be submitted to the City of Oakland Office of Parks and Recreation. The landscape plan should emphasize the use of new plantings of

TREE INVENTORY

FIGURE 4.4-1



SOURCE: COLLABORATIVE DESIGN ARCHITECTS



native coast live oak trees, and other species common to the oak woodland setting present at the project site. The plan should also emphasize the use of drought-tolerant plant species, and the use of water-saving drip irrigation systems.

Impact

- 4.4-2 **The project would result in the loss of approximately one acre of serpentine grassland from the site.**

At the time of the field surveys, no populations of rare plants or wildlife were found on the site. Although the serpentine grassland is considered sensitive habitat by the California Department of Fish and Game because of its limited extent in California and because it is known to typically support a number of sensitive plant species, this habitat does not have legal standing as a protected habitat similar to wetlands at this time. Since no associated sensitive or rare plant or animal species were found on this suitable habitat, the loss of serpentine grassland is not considered significant. The City and East Bay Regional Park District are protecting other serpentine habitats in the project area that support rare plant species, and therefore, cumulative loss of serpentine grassland is not expected to be significant.

Mitigation Measure

- 4.4-2 None required.

Impact

- 4.4-3 **The project would cause the loss of some coastal sage scrub plant community from the site.**

In some parts of California, primarily southern California, coastal scrub communities are considered sensitive habitat because they support a number of sensitive plant and animal species including birds, lizards, and mammals. This particular type of coastal sage scrub does not occur on the site, nor do the associated sensitive plant and animal species. Therefore, the loss of coastal sagebrush scrub habitat on the site would not be considered a significant adverse impact.

Mitigation Measure

- 4.4-3 None required.

Impact

- 4.4-4 **The project would disrupt wildlife species which currently occupy or visit the site.**

Construction activities would disturb wildlife on the site. Mobile species, such as birds adapted to urban landscapes, are likely to return to the area after construction. Some nesting habitat may be destroyed, but adequate habitat can be created with careful landscaping. Other species that are less mobile are likely to be destroyed and their habitat lost. These probably include ground dwelling species such as ground squirrels, mice, voles, and other small mammals. Individuals reptiles such as the common gopher snake and various lizards are also likely to be destroyed. These species, and others, are common throughout the Oakland hills and their loss is considered less than significant.

Mitigation Measure

- 4.4-4 None required.

-
1. Project site vegetation survey conducted on June 21, 1988 by EIP Associates staff biologist.
 2. State of California, Department of Fish and Game. Element rankings based on a system developed by the Nature Conservancy and used in the California Natural Diversity Data Base. Unpublished paper.
 3. Kruckeberg, A. R. 1984. *California Serpentine: Flora, Vegetation, Geology, Soils, and Management Problems*. Univ. of Calif. Press, Volume 78.
 4. Gould Publications, Inc. 1986 through 1990. *Fish and Game Code of California*, "Chapter 12, Significant Natural Areas", Sections 1930 to 1933.
 5. State of California, Department of Fish and Game. 1990. *Significant Natural Areas of California, 1990 Annual Summary*. Unpublished mimeo by the Department of Fish and Game.
 6. U.S. Department of the Interior, U. S. Fish and Wildlife Service. 1988. Section 4 "Determination of endangered species and threatened species", *Endangered Species Act of 1973 As Amended through the 100th Congress*.
 7. Gould Publications, Inc. 1986 through 1990. *Fish and Game Code of California*, "Chapter 1.5, Endangered Species", Sections 2050 through 2098.

8. State of California, Department of Fish and Game. 1991. *Special Animals*. Unpublished paper from the Natural Diversity Data Base, August 1991.
9. Smith, Jr., J. P., and K. Berg. 1988. *Inventory of Rare and Endangered Vascular Plants of California*. California Native Plant Society, Special Publication No. 1 (Fourth Edition), September, 1988.
10. State of California, Office of Planning and Research. 1986. *The California Environmental Quality Act: Statutes and Guidelines*. June 1986 Edition.
11. Survey by Ric Villasenor, EIP Associates staff biologist, June 1988.
12. State of California, Department of Fish and Game. 1984. *Guidelines for Assessing Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities*. Unpublished paper, May 4, 1984.
13. Survey conducted by Barrett Anderson, EIP Associates staff botanist.
14. California Natural Diversity Data Base, *Element Occurrence Records*, San Francisco, 1987.

4.5 TRAFFIC AND CIRCULATION¹

SETTING

The proposed project is located at the northwest corner of Redwood Road and Crestmont Drive. The primary roads serving the area are State Route 13 (SR-13), Interstate Route 580 (I-580), Redwood Road, and Crestmont Drive (see Figure 3-1 and 3-2 for a depiction of these roadways).

State Route 13 and I-580

State Route 13 (SR-13) and I-580 are the major freeways in the project vicinity. Both SR-13 and I-580 can be accessed from Redwood Road; the interchanges are approximately 1.5 and 2.6 miles, respectively, from the project site. In the vicinity of Redwood Road, SR-13 is two lanes in each direction, and I-580 is four lanes in each direction. SR-13 carries approximately 50,000 vehicles daily; the total two-way p.m. peak-hour traffic volume is about 5,500 vehicles.² I-580 currently carries about 179,000 vehicles daily, of which about 17,000 vehicles are carried during the p.m. peak hour (Caltrans, 1987).

Redwood Road

Redwood Road/35th Avenue is a major link between SR-13 and I-580 and provides access to other major travel routes as well as the Oakland hills. In the vicinity of the proposed project site, Redwood Road is two lanes in each direction, with a curb-to-curb width of 80 ft., separated by a raised median of varying width. There are no sidewalks on Redwood Road in the immediate project vicinity. On-street parking is not allowed on either side of Redwood Road between Crestmont Drive and Skyline Boulevard. Redwood Road carries approximately 10,000 vehicles per day and an estimated 580 vehicles during the p.m. peak hour, between Crestmont Drive and Skyline Boulevard.¹

Redwood Road adjacent to the project site is relatively steep, and average vehicle speeds are 40 miles per hour (mph) (see Appendix D). Traffic accident records for the period of January 1985 through September 1987 were reviewed as part of the background analysis.³ A total of eight accidents, two of which resulted in injury, occurred on Redwood Road between Crestmont Drive and Skyline Boulevard during this 32 month period. No accidents occurred that involved drivers who made maneuvers from either Old Redwood Road (which connects to Redwood Road opposite the southeasternmost portion of the site) or from the nearby tennis club or law offices driveways (east of the site).

Crestmont Drive

Crestmont Drive is a collector street that serves the residential areas between Redwood Road and Joaquin Miller Road. Adjacent to the project site, Crestmont Drive is a two-lane road with a curb-to-curb width of 38 feet and a five-foot sidewalk on the south side. On-street parking is allowed on both sides of Crestmont Drive in the immediate project vicinity. There is sufficient curb length on the north side of Crestmont Drive, between Redwood Road and the western corner of the project site, to accommodate approximately 10 to 12 parked autos. No cars were observed parked along this section of curb when surveyed during a weekday early afternoon survey period. Crestmont Drive carries an estimated 2,300 vehicles during the day and a total of 130 cars during the p.m. peak hour.¹

The project area is characterized by steeply sloped and curving roadways. These roadways can be difficult for the maneuvering of emergency vehicles and sanitation vehicles. A survey of local area roadway grades indicates that slopes vary from 12.2 percent to 20.3 percent in the vicinity of the proposed project site (see Table 4.5-1). The steepest grade in the area, at 20.3 percent, is located at Kimberly Heights Drive near Crestmont Drive. Although this grade exceeds current Office of Public Works standards--15 percent is the maximum recommended slope, 20 percent is the maximum allowable slope--representatives from the Oakland Fire Department and the Oakland Scavenger Company indicate that these roads are accessible to their vehicles.⁴

Intersections

Based on consultation with City Traffic Engineering staff, only the intersection on Redwood Road and Crestmont Drive was evaluated for this project; it appears that project-generated traffic would have a negligible effect on any other intersection in the local area.⁵ The Redwood Road/Crestmont Drive intersection is signalized and operates with fully activated control as a three-phase signal.

Intersections are almost always the critical factor in determining the traffic handling capacity of any circulation system. Intersection traffic operation is measured by a scale called "Level of Service" (LOS), which ranges from LOS A, indicating uncongested flow and the least delay on intersection approaches, to LOS F, indicating operation over theoretical capacity with significant congestion and delay for drivers. Most urban areas consider LOS D to be the poorest acceptable LOS, while smaller, rural areas often use LOS C as the minimal acceptable standard. (Appendix E provides LOS descriptions and relationship to Volume-to-Capacity (V/C) ratios.)

TABLE 4.5-1
EXISTING ROADWAY VERTICAL GRADES

<u>Location</u>	<u>Vertical Grade in Percentage</u>	<u>Length of Slope</u>
Crestmont Drive (between Samaria Lane crossing)	12.2%	190 ft.
Crestmont Drive (west of Westfield Way)	18.5%	280 ft.
Kimberlin Heights Drive (near Crestmont Drive)	20.3%	140 ft.
Private Street (on Sereno Circle)	20.3%	N/A
Westfield Way (at Crestmont Drive)	17.6%	135 ft.
Westfield Way (west of Creighton Way)	18.5%	170 ft.
Rishell Drive (at Kimberlin Heights Drive)	14.0%	N/A

N/A: Not applicable.

Source: Thompson Engineers, Inc., 1987.

P.M. peak hour (5:00-6:00 p.m.) turning movement counts were obtained for the Redwood Road/Crestmont Drive intersection, and were used to determine the existing intersection LOS; City Traffic Engineering staff consider p.m. peak hour traffic to be more indicative of peak use than a.m. peak hour counts. These traffic volumes, which were originally obtained in 1988, are shown in Figure 4.5-1. The figure also shows, in parentheses, the additional vehicle trips that would be added by the project to specific turn movements. As shown in Table 4.5-4, these counts, translated to LOS and V/C figures, were adjusted upward by one percent per year to provide a more accurate representation of existing (1992) conditions.

The Redwood Road/Crestmont Drive currently operates at LOS A during all times of the day, including the p.m. peak hour. No apparent traffic operational problem is encountered during the p.m. peak hour.

Existing Transit Service

Several Alameda County (AC) Transit lines operate along Redwood Road and Skyline Boulevard. The 46 and V-San Francisco (commute hours only) AC bus lines run on Skyline Boulevard and the 54 and 64 bus lines operate on Redwood Road running towards Merritt College.⁶ No buses operate on Redwood Road, between Campus Drive and Skyline Boulevard. Hence, the nearest bus stop to the project site area is at Redwood Road and Campus Drive.

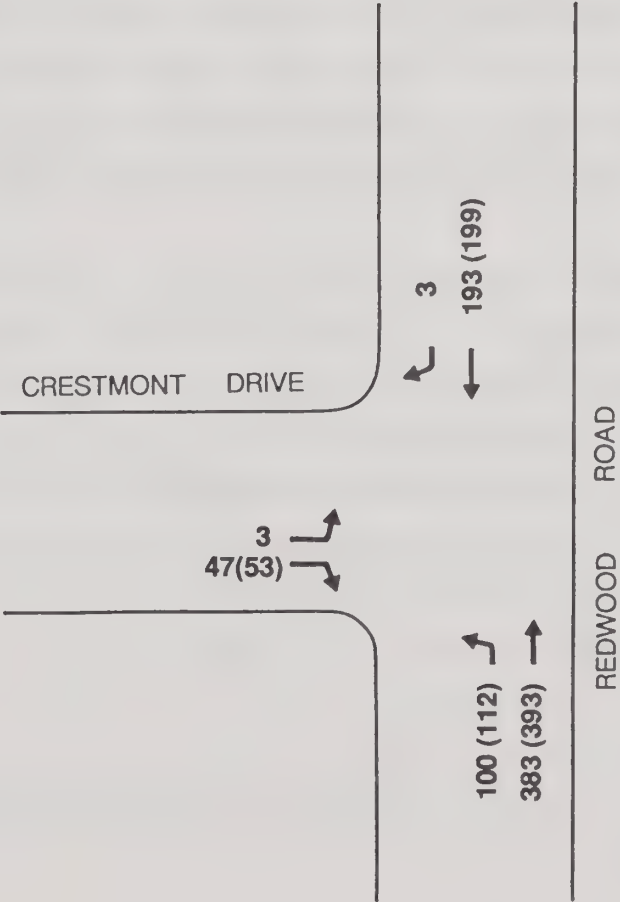
IMPACTS AND MITIGATION MEASURES

Traffic and circulation impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

PM PEAK HOUR TRAFFIC COUNT AT
REDWOOD ROAD/ CRESTMONT DRIVE INTERSECTION ¹

FIGURE 4.5-1



¹ Number outside parentheses represents existing movement count in direction of arrow; number inside parentheses represents existing-plus-project movement counts.

Trip Generation and Distribution

Impact

- 4.5-1 **The project would generate about 240 daily vehicle trips, of which about 34 would occur during the p.m. peak hour.**

The proposed 32-unit residential PUD would generate about 240 two-way trips (trip ends), with about 22 inbound and 12 outbound p.m. peak hour trips (see Table 4.5-2, page 4.5-6). These trips would be distributed on the local area roadway system in a manner similar to that of adjacent residential areas: a.m. peak period travel exiting the site would be expected to go south on Redwood Road towards downtown Oakland; p.m. peak period travel arriving to the site would be expected to go north on Redwood Road, continuing through the Redwood Road/Crestmont Drive intersection to the upper portion of the site, or turning left at the intersection to the lower portion of the site.

Five nearby projects were identified by City staff as having the potential to contribute to cumulative increases in traffic volumes on roadways in the immediate project vicinity. These projects are the Oakland Hills Tennis Club Expansion (located directly east of the project site), the Redwood Road Athletic Club (south of the site at Redwood Road and Campus Drive), the Montebello Terrace Subdivision (southwest of the site on the north side of Redwood Road, midway between Campus Drive and Mountain Boulevard), Oak Knoll Vista Estates (about three and one-half miles southeast of the site), and the Mayer Subdivision (north of the site on Redwood Road, north of the Redwood Road/Skyline Boulevard intersection) Table 4.5-3 shows the estimated number of p.m. peak-hour trips which these developments are anticipated to generate. For the purpose of developing a conservative cumulative impact scenario, a growth rate of one percent per year was used.⁷ This methodology is more precise than speculating on the number of cumulative project trips which might pass through the study intersection.

As shown in Table 4.5-4, addition of project traffic to existing conditions would increase overall traffic V/C ratios at the study intersection by less than two percent under existing or cumulative conditions. Project-generated traffic would be unnoticeable against the backdrop of existing and projected traffic volumes and would not discernably affect daily or peak hour traffic flow at the intersection studied. This is not considered a significant effect.

TABLE 4.5-2
TRIP GENERATION FOR THE OAKCREST PROJECT

<u>Land Use</u>	<u>Daily Trips</u>	<u>Morning Peak Hour</u>			<u>Evening Peak Hour</u>		
		<u>Enter</u>	<u>Exit</u>	<u>Total</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>
SINGLE-FAMILY RESIDENTIAL							
Vehicle Trips per Unit ¹	10	0.21	0.55	0.76	0.63	0.37	1.00
Total Trips for 16 Units	160	3	9	12	10	6	16
TOWNHOUSE							
Vehicle Trips per Unit ²	5	0.15	0.78	0.93	0.78	0.38	1.16
Total Trips for 16 Units	80	2	12	14	12	6	18
TOTAL TRIPS	240	5	21	26	22	12	34

¹ Based on ITE trip generation rates.

² Based on Caltrans 13th Progress Report on trip generation rates.

TABLE 4.5-3
CUMULATIVE PROJECT TRIP GENERATION

<u>Project Name</u>	<u>P.M. Peak Hour Trips</u>		
	<u>Enter</u>	<u>Exit</u>	<u>Total</u>
Montebello Terraces ¹	45	25	70
Oakland Hills Tennis Club Expansion ²	46	12	58
Oak Knoll Vista ³	29	17	46
Redwood Road Athletic Club ⁴	67	43	110
Mayer Subdivision ⁵	15	8	23
TOTAL TRIPS	202	105	307

¹ LSA, *Montebello Terrace Subdivision*, Final EIR, 1988.

² EIP Associates, *Oakland Hills Tennis Club Expansion*, Final EIR, 1988.

³ LSA, *Oak Knoll Vista Estates*, Final EIR, 1991.

⁴ EIP Associates, *Redwood Road Athletic Club*, Final EIR, 1985.

⁵ Earth Metrics, Inc., *Mayer Subdivision*, Draft EIR, 1992.

TABLE 4.5-4
PROJECTED PEAK-HOUR INTERSECTION
VOLUME-TO-CAPACITY RATIOS (V/C)
AND LEVELS OF SERVICE (LOS)¹

<u>Intersection</u>	<u>1988</u>		<u>1992 (Existing)²</u>		<u>Existing Plus Project</u>		<u>Cumulative Year 2000 (Including Project)</u>	
	<u>LOS</u>	<u>V/C</u>	<u>LOS</u>	<u>V/C</u>	<u>LOS</u>	<u>V/C</u>	<u>LOS</u>	<u>V/C</u>
Redwood Road/ Crescent Drive	A	0.20	A	0.24	A	0.25	A	0.33 ³

¹ LOS descriptions and relationship to V/C ratios are shown in Table 1, Appendix D.

² Annual growth rates in background traffic levels in this part of Oakland are between 0.5 and 1.0 percent (Mike Vecchio, Oakland Traffic Engineer, telephone conversation, January 3, 1992). A growth rate of 1.0 percent/year was used for a conservative analysis.

³ Annual growth rates for the 1992-2000 period are assumed to be 1.0 percent or less, based on figures provided by the Traffic Engineering Division of the Department of Public Works.

Source: EIP Associates; DKS Associates; E. Thompson.

Mitigation Measure

4.5-1 None required.

Site Access and CirculationImpact

4.5-2 **Vehicular access to the upper portion of the site would require a public access easement from the City's Office of Public Works. To obtain such an easement, the project must demonstrate itself not to be detrimental to traffic flow on Redwood Road.**

Due to the steep topography of the proposed project site, it would be infeasible to construct a single internal road, entered from Crestmont Drive, which would serve both the lower and upper portions of the site. The project site has therefore been divided into upper and lower portions, accessed via Redwood Road and Crestmont Drive, respectively. The upper (northern and eastern) portion of the site would contain 15 detached single-family homes; the lower (southern and western) portion of the site would contain 16 clustered townhouse units (in seven buildings) and one detached single-family home.

Access to the upper portion of the site would be via a new 400-foot-long, 24-foot wide road connecting to Redwood Road (opposite Old Redwood Road); this new road would terminate in a cul-de-sac with a 50-foot diameter. The upper access road is proposed to have a maximum vertical grade of 19.4 percent for a length of about 270 feet. Access to the lower portion of the site would be via a new 250-foot-long, 20-foot wide road connecting to Crestmont Drive (opposite Samaria Lane); this road would terminate in a bulb-cul-de-sac, with a 52-foot diameter and an 18-foot wide oval-shaped island median.

To provide access to the upper portion of the site as proposed, vehicles would have to cross adjacent City property, and a public access easement is required from the City's Department of Public Works. To obtain such an easement, the project sponsor is required to demonstrate that access across public property would not be detrimental to traffic flow along Redwood Road. In December 1987, a traffic study was conducted to evaluate the effects of site access at the proposed location¹; the results of this study are summarized below.

If the project were to provide full access to the upper portion of the site, the existing raised medium at the Redwood Road/Old Redwood Road intersection would need to be opened, allowing all turning movements at this location. Eighty-five percent of vehicles on Redwood Road, in the vicinity of Old Redwood Road and the proposed upper access road (uphill and downhill directions), travel at speeds of about 40 miles per hour (mph). To provide safe stopping distances, the Department of Public Works has established minimum sight distances which must be present to allow roadway reconfigurations, such as the one described. Field surveys indicate that inadequate sight distances are present at this location for left turns onto Redwood Road in both the northbound and southbound directions. Therefore, a medium break would be unsafe at this location, and none is proposed as part of the project. The upper access road/Redwood Road intersection would be limited to right-turn-in and right-turn-out movements.

To access the upper portion of the project site from the south, vehicles would travel past Old Redwood Road to the tennis club driveway (approximately 1,300 feet), make a U-turn, and head south to the upper access road. A U-turn at this location is permitted, and speed and sight distance surveys indicate that such a maneuver would be safe.⁸

Mitigation Measure

- 4.5-2 The curb lane on the north side of Redwood Road, where it would intersect with the proposed upper access road, should be widened to the east and west of the upper access road. In addition, new directional signs should be added as follows (also shown in Figure 4.5-2):
- One-way sign at Redwood Road median across from and facing the upper access road;
 - Stop signs at the exit point of the upper and lower access roads;
 - Right-turn-only sign at the exit point of the upper access road.

Impact

- 4.5-3 **The length and the slope of the upper access road would exceed the City's Office of Public Works maximum recommended standards for public and private streets.**

The City of Oakland Office of Public Works uses the following standards in evaluating plans for public and private streets; these standards are consistent with Oakland Fire Department standards:

Minimum roadway width (excluding parking)	20 feet
Minimum diameter for turnaround at end of cul-de-sac	50 feet
Recommended maximum slope	15 percent
Maximum slope acceptable at any location	20 percent
Maximum length of cul-de-sac	300 feet

Based on the proposed project design plans, the upper access road would have a maximum vertical grade of 19.4 percent for a length of about 270 feet, and a total length of about 400 feet, both in excess of the standards described above. The proposed upper access road would meet the standards for minimum roadway width and minimum diameter for cul-de-sac turnaround.

Mitigation Measure

- 4.5-3 The upper access road should have a surface designed and maintained to support the imposed loads of fire apparatus; the surface should provide all weather driving capabilities. Grooved Portland Cement Concrete (PCC) pavement should be provided for all portions of the road with slopes exceeding 20 percent.⁹

Impact

- 4.5-4 **The existing topography and vegetation near the proposed lower access road would limit sight distances for vehicles exiting that road.**

Based on the proposed project design plans, the lower access road would be entered from Crestmont Drive opposite Samaria Lane, approximately 270 feet northwest of the Redwood Road. The lower access road would be 20 feet wide, and would generally follow the natural topography of the site at it curves up the oak knoll to a bulb-cul-de-sac terminus. The intent of the project architect is to preserve some of the existing oak trees at this location, and to minimize the amount of cutting and filling required for the project.

Eighty-five percent of vehicles on Crestmont Drive, in the vicinity of Samaria Lane and the proposed lower access road (eastward and westward directions), travel at speeds between 29-33 mph. To provide safe stopping distances, the Department of Public Works has established minimum sight distances which must be present to allow roadway reconfigurations, such as the one described. Field surveys indicate that inadequate sight distances are present at this location for vehicles exiting the

site from the proposed lower access road, due to the topography of the oak knoll and Crestmont Drive street geometry.¹

Mitigation Measure

- 4.5-4 Adequate sight lines for vehicles exiting the lower access road would be created if vegetation were pruned (particularly oak tree No. 11 shown on Figure 4.4-1) and brush cleared, and the southwestern portion of the oak knoll slightly graded. The general contractor should measure the sight distance from the exit lane of the lower access road to Redwood Road, to ensure that an unobstructed sight distance of no less than 200 feet has been achieved.

Impact

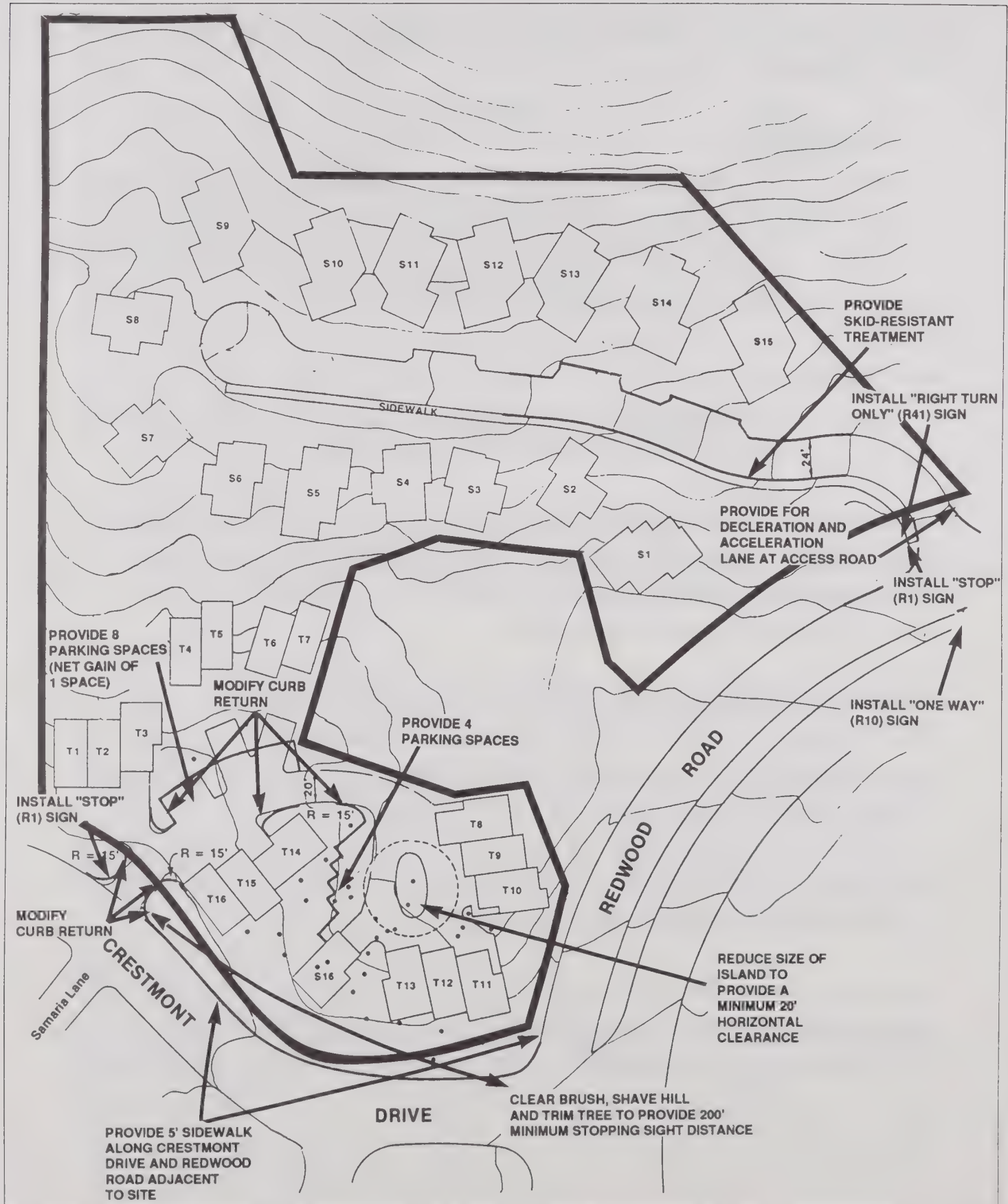
- 4.5-5 **The configuration of the proposed lower access road would limit the maneuverability of emergency vehicles on the project site.**

As described above, the proposed lower access road would be located across from Samaria Lane at Crestmont Drive. The road would be 20 feet wide, and would follow the curving topography of the oak knoll terminating in a bulb-cul-de-sac. The bulb would be approximately 52 feet in diameter, with an 18-foot oval-shaped island median at its center.

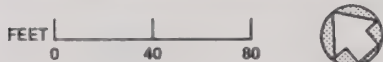
The 1985 Fire Code Regulations require a minimum of 20 feet of horizontal clearance for fire access, and a turning radius of at least 50 feet. The turnaround (bulb) portion of the lower access road would provide a sufficient turning radius, but the proposed configuration of the island medium would reduce horizontal clearance to less than 20 feet.

Curb returns at several locations (identified in Figure 4.5-2) would not have sufficient turning radii for on-site parking and emergency vehicle maneuverability.

Access to townhouse units T1 and T2 (also shown in Figure 4.5-2) would not be adequate to allow vehicle maneuvering into forward facing positions. Vehicles at these units would have to back out of the lower access road to Crestmont Drive, a distance of less than 100 feet. In addition, vehicles



SOURCE: THOMPSON ENGINEERS; EIP ASSOCIATES



exiting from the garage of townhouse unit T11 would be required to back out to the turnaround, a distance of less than 30 feet, at which point maneuvering into a forward facing position would be possible.

Mitigation Measure

- 4.5-5 All recommended circulation mitigation measures are illustrated in Figure 4.5-2. To provide a 20-foot horizontal clearance for emergency vehicle maneuverability at the lower access road turnaround, the island median should be reduced in size. This would require removal of one or both oak trees which otherwise would be preserved at this location (for further discussion of the biological effects of this mitigation measure, please see Chapter 4.4, Vegetation and Wildlife). Curb returns at locations identified in Figure 4.5-2 should be modified to provide a minimum 15-foot radius.

Parking

Impact

- 4.5-6 **The proposed project would provide eight fewer parking spaces at the lower portion of the site than estimated resident and visitor demand.**

City of Oakland Zoning Regulations for the R-30 zone require two parking spaces for each single-family dwelling, and 1.5 spaces for each unit of attached townhouses. The project would include 15 single-family units at the upper portion of the site, and 16 townhouse units and one single-family unit at the lower portion of the site. The parking requirement for the proposed project would therefore be 30 parking spaces at the upper portion of the site and 26 parking spaces at the lower portion of the site.

Actual parking demand may differ from zoning requirements. Based on studies conducted by Oakland City Planning Department, residential parking demand citywide is estimated to be one space per three habitable rooms, plus 0.2 spaces per residential unit for visitors. This formula for estimating residential parking demand was consistent with the findings of a telephone survey conducted as part of the background study for this EIR (the complete report of this survey is included in Appendix D).¹⁰ Based on this formula, the proposed project would have a parking demand of 41 spaces for the upper portion of the site (11 more spaces than required by zoning), and 38 spaces for the lower portion of the site (12 more spaces than required by zoning).

As proposed, the project would provide on-site parking spaces for 66 vehicles at the upper portion of the site, and 29 on-site parking spaces at the lower portion of the site, in the following configuration:

Upper portion of the site

- 15 units with two-car garages
- 30 driveway spaces
- Three parking bays for six on-street parallel parking spaces

Lower Portion of the site

- Four townhouse clusters with five spaces each
- One detached single-family unit with two-car garage
- Two detached two-car garages
- Three on-street perpendicular parking spaces

The project would therefore provide a surplus of 25 spaces in the upper portion of the site, and would have a deficit of nine spaces in the lower portion of the site, compared to demand estimates. Table 4.5-5 illustrates the parking evaluation conducted for the project. Four of the nine spaces demanded for the lower portion of the site would be for visitor parking, and could be accommodated by existing on-street parking availability along Crestmont Drive. The remaining demand of five resident parking spaces for the lower portion of the site would not be accommodated by the proposed project.

Mitigation Measure

- 4.5-6 As shown in Figure 4.5-2, the five-space resident parking deficit could be eliminated if the two detached two-car garages and the three on-street perpendicular parking spaces were replaced by eight on-street perpendicular parking spaces, and four angled parking spaces at the northwest side of the lower access road turn-around. This mitigation measure would require the removal of an additional five trees from this portion of the site (see Chapter 4.4, Vegetation and Wildlife, for the biological effects of this measure). Alternately, this deficit would be eliminated if the placement of some of the clustered townhouse units at the lower portion of the site, and some of the detached single-family homes at the upper portion of the site, was reversed. This alternative development scheme is analyzed under Alternative Two, Rearranged Site Plan.

TABLE 4.5-5
PROJECT PARKING EVALUATION¹

	<u>Parking Required By Zoning</u>	<u>Project Parking Demand²</u>	<u>Project Parking Supply</u>	<u>Parking Surplus/ Deficit</u>	<u>Surplus/ Deficit Without Visitor Demand</u>
UPPER PORTION OF SITE					
15 Single-Family Dwelling Units	30	41	66	+25	+22
LOWER PORTION OF SITE					
16 Townhouses and One Single-Family Dwelling Unit	26	38	29	-9	-5

¹The complete parking analysis is illustrated in Appendix E.

²This amount is combined resident and visitor demand.

Source: Thompson Engineers, 1987.

Pedestrian Travel

Impact

- 4.5-7 **There are no sidewalks along Redwood Road or Crestmont Drive adjacent to the project site, making pedestrian travel at these locations unsafe.**

Pedestrian travel to and from the proposed upper and lower access roads would potentially be unsafe due to the lack of existing sidewalks adjacent to the project site. On Redwood Road, pedestrians would be required to walk within the traffic lane on either side of the street. There is no designated pedestrian crosswalk from the proposed upper access road to Old Redwood Road, and if pedestrians were to cross at this location, they would have to cross the roadway median. On Crestmont Drive, pedestrians would likely cross to the southwest side of the street where a sidewalk currently exists; however, there is, at present, no designated pedestrian crosswalk at the location of the proposed lower access road and Samaria Lane. Sidewalks and crosswalks would be needed to provide safer access for project residents (especially children) to the nearby Pinto Recreation Area.

Mitigation Measure

- 4.5-7 A continuous sidewalk should be provided adjacent to the project site along Redwood Road and Crestmont Drive. The new sidewalk should be designed in conformance with applicable Department of Public Works standards, and should include associated curbs and gutters, and be handicap-accessible.

-
1. This chapter is based on *Oakland Development Traffic Study*, Thomson Engineers, Alameda, CA., January 1989.
 2. Daily and peak period traffic volumes for State Route 13 and Interstate Route 580 were obtained from the *Oakland Hills Tennis Club Expansion Final EIR*, June 1988.
 3. Accident records for the City of Oakland are maintained by the Office of Public Works Traffic and Parking Division.
 4. Telephone conversation, Chief Sigwart, Oakland Fire Department, August 10, 1988; telephone conversation, Mr. Perata, Oakland Scavenger Company, August 18, 1988. In a telephone conversation on April 15, 1992, Lt. Ed Claussen of the Oakland Fire Department Services Department, indicated that while a fully-loaded fire truck (weighing about 27,000 pounds) is capable of driving up 20% grades, such as those identified in Table 4.5-1, response times would be significantly slowed.

5. Telephone conversation, Michael Vecchio, Department of Public Works Traffic Engineering, April 14, 1992.
6. AC Transit Street and Route Map, April 1991.
7. Telephone conversation, Michael Vecchio, Department of Public Works Traffic Engineering Division, January 3, 1992.
8. Thomas Engineers, *Oakland Development Traffic Study*, January 1989.
9. Mitigation Measure derived from *Shared Access Facilities Guidelines for Development and Evaluation*, Section IV.A.2(h), The Oakland City Planning Department, January 1991.
10. On January 5, 1989, EIP Associates staff polled residents of the townhouse development at 73 Hiller Highlands and the development opposite the project site at Samaria Lane. Residents were asked the number of habitable rooms in their home, number of bedrooms, and vehicle ownership characteristics. A complete recitation of the findings of this survey is included in Appendix D.

4.6 VISUAL QUALITY

SETTING

The Oakland hills form a distinctive visual backdrop to the eastern edge of the cities of Oakland and San Leandro. The approximately four-acre undeveloped project site is situated about 1,500 feet below the ridgeline of the Oakland hills (approximately Skyline Boulevard), immediately northeast of the Redwood Road/Crestmont Drive intersection. As described earlier in Chapter 4.1, Land Use and Relationship to Plans and Policies, the project site itself, and areas adjacent to the site to the east and northwest, are primarily open grassland and scrub, with interspersed pockets of mature pine, oak and eucalyptus trees. Due to the widely varying contours of the site, and its mix of vegetation types and rock outcroppings, the site represents a distinctive area of scenic visual interest, and is visible from near and distant locations. (Figure 4.6-1 shows the project site as seen from High Street, west of I-580; Figures 4.6-2, 4.6-3 and 4.6-4 show existing views of the project site.)

To the north of the site is a continuation of the open hillside features, followed by detached single-family homes. To the east of the site, beyond the adjacent undeveloped area, is the Oakland Hills Tennis Club. To the south of the site, across Redwood Road, is the Pinto Recreation Area, the Leona Heights Park, and further south, detached single-family homes. To the west of the site, across Crestmont Drive, are detached single-family homes and townhouses. Due to the location and the steepness of the project site, nearly all of the surrounding land uses have unobstructed sight lines to the site.

Views from the lower portion of the site (adjacent to Redwood Road and Crestmont Drive) are limited to nearby land uses; views from the middle and upper portions of the site are wide-ranging, including views of nearby land uses, as well as unobstructed views of the cities of Oakland, San Francisco, Alameda and the Peninsula.

IMPACTS AND MITIGATION MEASURES

Visual quality impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

PROJECT SITE AS SEEN FROM HIGH STREET, WEST OF INTERSTATE 580

FIGURE 4.6-1



4.6-2

SOURCE: EIP ASSOCIATES



EXISTING VIEW OF PROJECT SITE LOOKING NORTH
ACROSS CRESTMONT DRIVE AND REDWOOD ROAD

FIGURE 4.6-2



SOURCE: EIP ASSOCIATES

EXISTING VIEW OF PROJECT SITE LOOKING EAST FROM SAMARIA LANE

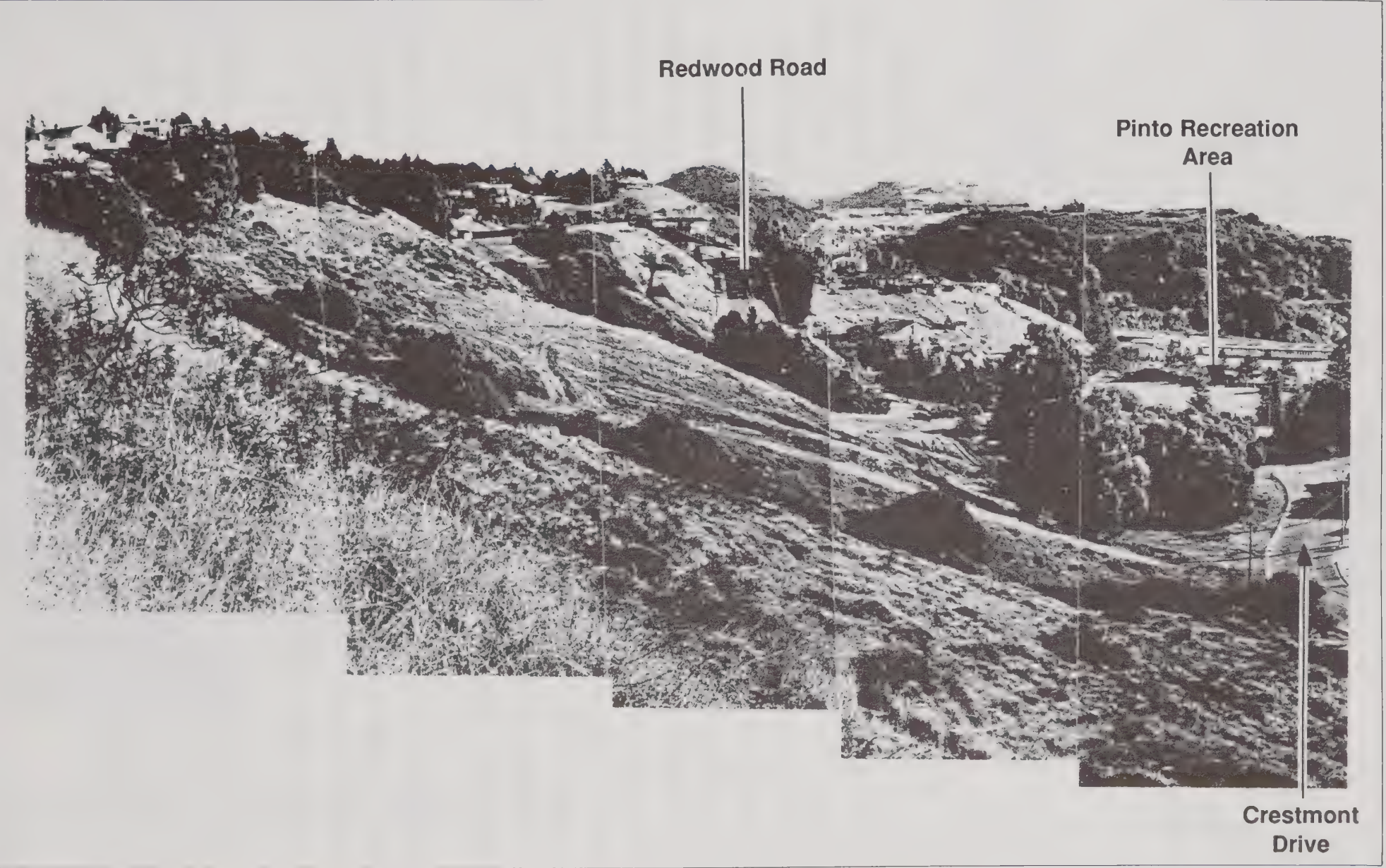
FIGURE 4.6-3



SOURCE: EIP ASSOCIATES

EXISTING VIEW OF PROJECT SITE LOOKING SOUTHEAST

FIGURE 4.6-4



4.6-5

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

Impact

- 4.6-1 The project would replace open hillside terrain and would be visible from near and distance vantage points. The project, located between adjacent open hillside areas to the east and northwest, would appear to divide the otherwise continuous hillside.**

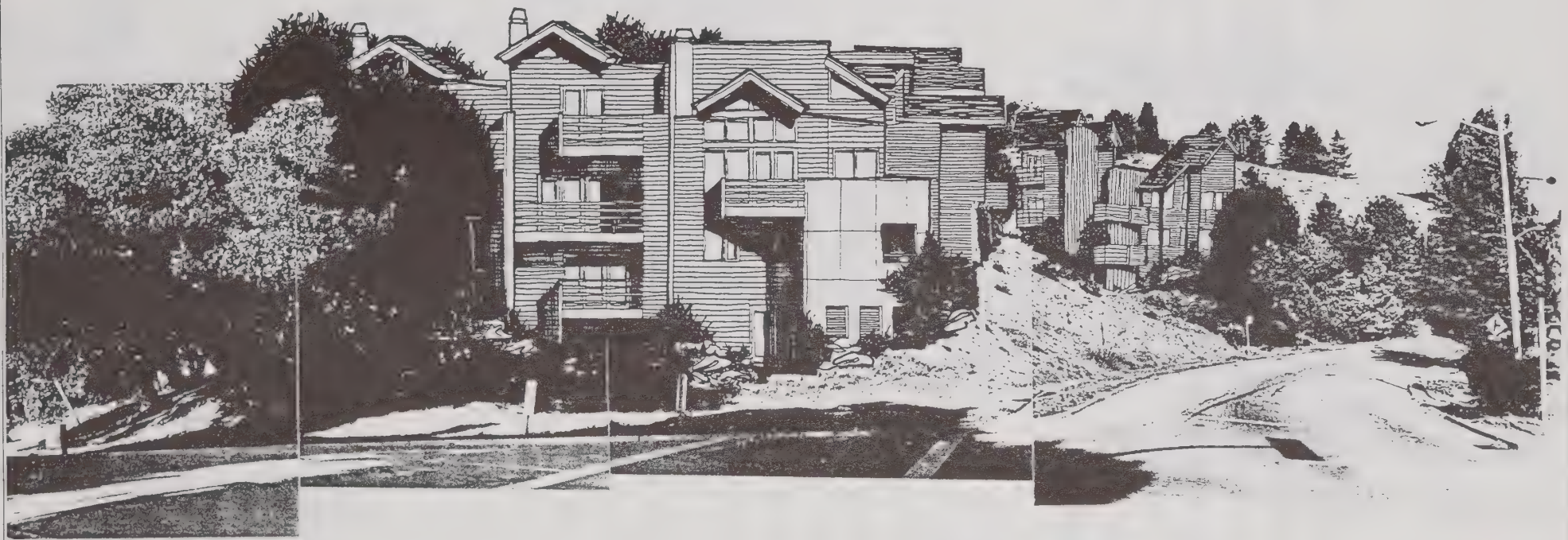
At present, architectural design for the project has been limited to schematic representations. There would be a total of 32 units contained in 24 structures; about one-half of the units would be detached houses. The detached units would occupy the upper portion of the site, lining both sides of a proposed road/cul-de-sac. The attached units would be grouped in seven clusters at the lower portion of the site. The clustered units would line a proposed road/bulb-cul-de-sac, located on the knoll at the southwesternmost portion of the site. All proposed structures would be within the 35-ft. height limit imposed by the Zoning Ordinance for the R-35 district; however, due to the steepness of the site and surrounding area, the structures might appear taller than 35 ft. from adjacent streets. The final determination of architectural style and design, including types of exterior finishing and roofing materials, will be under the purview of the City Planning Commission, during their design review. A schematic architectural model of the proposed project, photographed from three perspectives, is presented in Chapter 3, Project Description (see Figures 3-7, 3-8 and 3-9).

To evaluate the potential visual impacts of the proposed project, architectural renderings of the proposed buildings have been superimposed on existing site photographs; this process is commonly referred to as photomontage. "Before" and "after" views of the site from three perspectives are provided in Figures 4.6-2 through 4.6-4.

Figure 4.6-2 shows an existing view of the site looking north across Crestmont Drive and Redwood Road. From this perspective, the wooded knoll or lower portion of the site is in the center of the photograph. Figure 4.6-2A shows the potential visual effects of the project from this vantage. Some of the proposed structures in the lower and upper portions of the site would clearly be visible;

VIEW OF PROJECT SITE LOOKING NORTH ACROSS CRESTMONT DRIVE
AND REDWOOD ROAD WITH THE PROJECT (PHOTOMONTAGE)

FIGURE 4.6-2A



NOTE: Architectural renderings of the proposed project are schematic; the project
will be subject to discretionary design review by the Oakland City Planning Commission.

SOURCE: EIP ASSOCIATES

clustered units on the north side of the proposed lower access road would be partially screened by retained trees.

Figure 4.6-3 shows an existing view of the site looking east from Samaria Lane across Crestmont Drive. From this perspective, the knoll is on the right side of the photograph. Figure 4.6-3A shows the potential visual effects of the project from this vantage. The lower access road proposed for the lower portion of the site is located in the center of the photomontage, flanked by clustered townhouse units. Retained trees would not serve to screen clustered units from this perspective; however, views from this vantage of detached units proposed for the upper portion of the site would be blocked by retained trees and clustered units.

Figure 4.6-4 shows an existing view of the site looking southeast from the adjacent open hillside. From this perspective, the entire project site and nearby areas to the southeast are visible. Figure 4.6-4A shows the potential visual effect of the project from this vantage. The upper and lower portions of the site are visible from this perspective. From this perspective, the visual effects of the project seems less prominent than in the other photomontages, despite the fact that more of the proposed development is visible; this results from the higher elevation of this perspective than the previous two photomontages.

The proposed project, being located between adjacent open hillside areas to the east and northwest, would appear to divide the otherwise continuous hillside. This effect would be most noticeable from lower elevations, such as those shown in Figures 4.6-2 and 4.6-3, and from areas further to the west, such as the view shown in Figure 4.6-1. This effect would not be as noticeable from more oblique perspectives, such as that shown in Figure 4.6-4. (The potentially growth-inducing effects of the proposed project are discussed in Chapter 5, Growth Inducements.)

The project architect intends to design the individual units to reduce their potential visual impact. The use of sloped roofs, hillside cuts and landscaping proposed as part of the project, would help to reduce the overall visual impact of the project. The project would not have a substantial, demonstrable negative aesthetic effect.

CEQA requires that EIRs distinguish between those mitigation measures proposed by the project sponsor to be part of the project and measures that are not part of the project and are not proposed

VIEW OF PROJECT SITE LOOKING EAST FROM
SAMARIA LANE WITH THE PROJECT (PHOTOMONTAGE)

FIGURE 4.6-3A

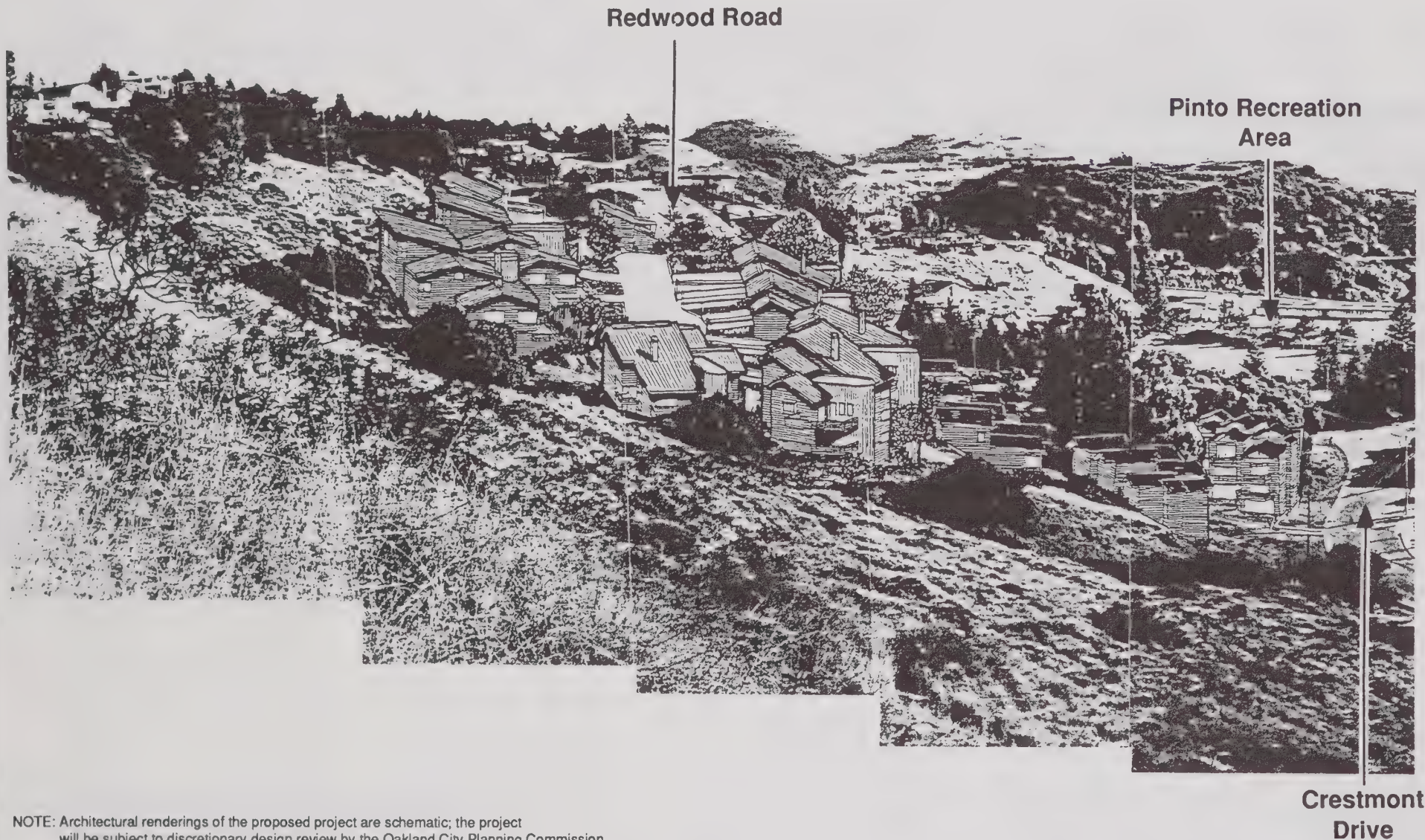


NOTE: Architectural renderings of the proposed project are schematic; the project will be subject to discretionary design review by the Oakland City Planning Commission.

SOURCE: EIP ASSOCIATES

VIEW OF PROJECT SITE LOOKING SOUTHEAST
WITH THE PROJECT (PHOTOMONTAGE)

FIGURE 4.6-4A



by the project sponsor. Unless otherwise stated, the visual impact mitigation measure identified below is not part of the project and was not proposed by the project sponsor.

Mitigation Measure

- 4.6-1 Vegetative screening, as described in Chapter 4.4, should be incorporated into final project design. New plantings of native coast live oak trees should be implemented to replace those trees removed or damaged during construction, and to increase the tree coverage on the site.

The covenants, conditions and restrictions (CC&Rs) for the proposed project should stipulate that exterior building finishes and roofing materials should be selected with sensitivity to the surrounding landscape and land uses. Light colored materials are preferred as they tend to blend in well with the surrounding grassland and scrub setting.

4.7 PUBLIC SERVICES AND UTILITIES

4.7.1 FIRE PROTECTION

SETTING

The Oakland Fire Department (OFD) provides fire protection, emergency medical, and rescue services throughout the City of Oakland. A majority of the calls to which the OFD responds are for medical emergencies. In 1989, the OFD responded to a total of 38,207 calls for service. Of that total, 27,495, or approximately 72 percent, were responses to medical emergencies. Emergency ambulance service is provided under contract by private companies.¹

The Oakland Fire Department has the goal of responding to emergency calls within four minutes. This goal is often met in the flat land portions of the City, but only sometimes met when responding to calls from hill locations.² Two fire stations would provide first-in-response service to the project site under normal circumstances: Station No. 21 located at 13150 Skyline Boulevard near Parkridge Drive, and Station No. 25 located at 2795 Butters Drive near Joaquin Miller Drive. Second-in-response services, or services provided under conditions when first-in-response engines have already been dispatched, would be provided by Station No. 17 located at 3344 High Street near the MacArthur Freeway, and Station No. 18 located at 1700 Fiftieth Street near Bancroft Street. Fire stations No. 21, 25, 17 and 18 are respectively located approximately 1.5, 1.0, 1.4 and 2.5 miles away from the project site.

The project vicinity is located within the Oakland hills. The Oakland Fire Department considers the hill areas of Oakland "critical fire zones." These zones are characterized by: 1) densely growing trees and highly flammable species of scrub; 2) steep slopes; and 3) proximity to other wild lands. According to the findings of the 1982 Urban Interface Fire Prevention Committee established by the East Bay Regional Parks District, serious wildland fire hazards exist along the 25-mile "urban-wildland interface zone" extending from the north end of Wildcat Canyon Regional Park in Richmond to the south end of Anthony Chabot Regional Park in Oakland.³ The project site is within this zone.

Provisions contained in the city's 1986 North Oakland Hills Fire Protection Ordinance, are relevant for development located in any hill area of Oakland. The Ordinance specifies the following fire protection measures: 1) use of fire retardant materials, particularly for building exteriors and roofing; 2) installation of residential standard fire sprinklers in the interior of all buildings; 3) adequate

building setbacks from surrounding "natural" open space areas; and 4) and a vegetative management program. The City has also prepared a set of residential sprinkler guidelines.

The City of Oakland requires a fire hydrant with "adequate flow" located within 500 feet of the most remote part of each single-family residence, and within 300 feet of the most remote part of multi-family residences. Adequate flow for the project is defined by the Fire Department requirements as 1,500 gallons per minute with 20 pounds of residual pressure in the main.⁴

IMPACTS AND MITIGATION MEASURES

Public services and utilities impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

The proposed project would not significantly impact existing fire protection services or the existing Fire Department response time goal of four minutes. The proposed project would not require expansion to existing Fire Department resources and/or facilities. The Fire Department does not anticipate that development of the project would significantly increase calls for service to the site and, therefore, would be able to serve the project with current departmental resources.⁵

Fire Department response times to the proposed project site from Station No. 21 and Station No. 25 would be approximately five to six minutes under normal circumstances.⁶ Response times from Station No. 17 and Station No. 18 would be slightly higher than those for first-in-response fire stations. Response times to the project site would not be expected to exceed the Department's average response times, and would be close to the Department's response-time goal of four minutes. The location of the proposed project would therefore not represent a significant fire response time impact.

Impact

- 4.7.1-1 **The project would affect local fire protection services by increasing the number of households in the "critical fire zone" of the Oakland hills. The critical fire zone area is characterized by steep slopes and highly flammable species of vegetation. The project would therefore constitute a significant fire protection impact.**

As discussed in the setting section, the project is situated within the 25 mile "urban-wildland interface zone," and therefore the Fire Department considers it within a "critical fire zone." The steep slopes and flammable on-site vegetation associated with the project would be a concern of fire department personnel.

Mitigation Measure

- 4.7.1-1 The following mitigation measures would reduce impacts to less than significant levels.
- To ensure adequate emergency access and fire protection measures, the project would be required to comply with the standards of the Oakland Uniform Building Code (1979 and 1982 editions) and the Uniform Fire Code.
 - Roofs, exterior surfaces, and interior walls should be made of stucco or other non-combustible material.
 - Interconnected smoke detectors should be provided in all of the units for increased safety.
 - Spark arrestors should be placed on all chimneys.
 - Standard residential fire sprinklers should be installed in the interior of all buildings.
 - Buildings should be setback at least 30 feet from surrounding "natural" open space areas to provide a fire break.
 - A homeowners association should institute a vegetative fuel management program (periodic weed abatement and brush removal).
 - The project landscape program should use low-fuel, native, drought tolerant plant species. The landscape program should also balance water conservation, fuel load limitation, visual screening, and habitat enhancement needs in choosing plant species.

- The project sponsor should provide stipulations (deed restrictions, etc.) as approved by the Fire Department, regarding minimum clearances around project structures that should be kept free of highly flammable vegetation.
- The project circulation system should establish adequate emergency vehicle access to permanent open space or wildland areas between the proposed homes identified as S7 and S8, located at the end of the upper road cul-de-sac.
- As applicable, the project should be designed with a system of fuel breaks between wooded areas and residential units (i.e., areas where the volume and spacial arrangement of vegetation is modified to retard the progress of an approaching fire). Within each fuel break area, Sage scrub (high volume fuel) should be removed and replaced with native perennial grassland (lower volume fuels and higher biotic value). Any vegetation that is removed should be replaced with a species of equal or higher biotic value that are fire-resistant.

Impact

- 4.7.1-2 Off-site fire hydrant locations in the project vicinity would be insufficient for service to the project site and would be considered a significant impact.**

The new development would not be adequately served by the off-site fire hydrants in the project vicinity since they lie beyond the Fire Department standards of 500 feet from the most remote part of each single-family residence, and beyond 300 feet from the most remote part of multi-family residences.

Mitigation Measure

- 4.7.1-2** The proposed project would require one fire hydrant with adequate flow on the upper roadway and one fire hydrant with adequate flow on the lower driveway to reduce impacts to less than significant levels. Adequate flow for the project is defined by the Fire Department requirements as 1,500 gallons per minute with 20 pounds of residual pressure in the main.⁶

Impact

- 4.7.1.3 Water pressure for fire protection would be substandard and this would be considered a significant impact.**

The East Bay Municipal Utility District (EBMUD) would conduct a hydraulic analysis of the water distribution system serving the vicinity of the project as a standard part of meeting a new service request (see discussion below in subsection 4.7.5, Water Supply and Distribution). At the request of the project sponsor, EBMUD would include an analysis of fire flow to the project site to determine if the distribution system can meet Fire Department requirements of 1,500 gallons per minute with 20 pounds of residual pressure in the main.⁷ Should the distribution system's fire flow capacity be substandard, then EBMUD would improve the system to meet fire flow requirements as a standard procedure in meeting a new service request.

Mitigation Measure

- 4.7.1-3 The project sponsor should request that EBMUD evaluate the fire flow of the present distribution system during its hydraulic analysis. If fire flow performance is below the standards of the Fire Department, EBMUD should make improvements to the water distribution system so that it is capable of meeting the Fire Department's fire flow standards. The project sponsor would be responsible for the costs of distribution system improvements as discussed in Mitigation 4.7.5-2, below.

4.7.2 POLICE PROTECTION

SETTING

The City of Oakland Police Department serves the project vicinity. The City has one police station, located at 455 Seventh Street, from which field units are deployed. The project site is covered by Beat 28. Response times to the project area vary depending on the priority with which the Department accords the call. From the time the call is received, calls are dispatched to field units which respond in between one and 50 minutes: calls regarding extreme emergencies, such as felonies, are dispatched in one to two minutes; calls that are second level in priority, such as accidents and family emergencies, are dispatched in nine to ten minutes; routine calls are usually dispatched within 50 minutes.

The crime level in the project area is relatively low, and Redwood Road provides good emergency access. Many of the calls to the area include nearby residents reporting noise problems due to high school students gathering at night in the Pinto Recreation Area, and at other locations.

IMPACTS AND MITIGATION MEASURES

The proposed project not create a significant increase in demand for police services. The project would not create the need for additional police personnel or resources, and would therefore not constitute a significant impact on the Police Department.⁸ The following measures are recommended by the Oakland Police Department to further improve on-site security and to improve police service should an emergency call come from the site. The City of Oakland Police Department Community Services Division recommends a set of structural and design features for all new development to minimize the risk of burglary and associated threats to personal security.

- All residences should display a clearly visible address plate with the numbers no less than six inches in height.
- All exterior doors and those leading to the interior from the garage should be 1.75 inches thick and solid core in construction.
- All exterior doors should be equipped with the following:
 - one-inch deadbolt locks, twin cylinder with key retaining feature;
 - optical viewer, front door only;
 - maximum security strike plates on all deadbolt locks;
 - Non-removable hinge pins on all exterior doors.

The project developer would be responsible for implementing the above measures.

4.7.3 SCHOOLS

SETTING⁹

The project site is located within the boundaries of the Oakland Unified School District. Elementary school-age students in the vicinity of the project attend Carl Munck Elementary School, located at 11900 Campus Drive approximately one-half mile from the project site. The school has capacity for approximately 350 students. Current enrollment (October, 1990) is at 455; the 105 students above the school's capacity are accommodated in portable classrooms located on a portion of the school's playground.

Junior high school-age students in the project vicinity attend Montera Junior High School, located at 5555 Ascot Drive approximately 1.5 miles from the site. Montera has capacity for 900 students. The current enrollment (October 1990) is 800 students.

High school-age students in the project vicinity attend Skyline High School, located at 12250 Skyline Boulevard approximately 1.5 miles from the project site. Skyline High School has capacity for approximately 2,000 students. Current enrollment (October, 1990) is at 1,861 students.

The Oakland Unified School District presently levies a development impact fee of \$1.58 per square foot of residential development to offset the capital costs associated with growth.¹⁰

IMPACTS AND MITIGATION MEASURES

Impact

- 4.7.3-1 **The 13 elementary school children generated by the project would require one-third of a portable class room.**

The Oakland Unified School District does not use standard student generation multipliers. Instead, they evaluate projects on a case by case basis, reviewing such factors as location, housing size, price range. In order to estimate student generation from the proposed project, this EIR uses the State Board of Education's state-wide student generation multipliers.¹¹ These provide a reasonable average estimate in the absence of more area specific factors.

The project would be expected to generate approximately 13 elementary students, 3 junior high school students, and 6 high school students based upon the proposed 32 dwelling units of the project. The high school and junior high school students would be accommodated within the surplus capacity of the respective schools as discussed in the setting section above. The elementary school students would require the addition of approximately one-third of a portable class room, associated equipment, supplies, and teaching staff at the Carl Munck Elementary School. The additional portable would be placed within the existing playground area.

Capacity at the Montera Junior High School would be adequate to accommodate the students generated by the project. It is anticipated that students generated by the project could be accommodated at Skyline High School.¹²

Mitigation Measure

- 4.7.3-1 Existing regulations would require the project sponsor to pay the District's development impact fee prior to issuance of a building permit. The fee would

amount to approximately \$117,110 based upon the project's 74,120 square feet of development and the District's impact fee of \$1.58.

4.7.4 PARKS, RECREATION AND OPEN SPACE

SETTING

The City of Oakland and the East Bay Regional Park district (EBRPD) operate parks, recreation facilities and open space in Oakland and in surrounding areas readily accessible to Oakland residents. The Open Space, Conservation, and Recreation Element of the Oakland Comprehensive Plan contains an analysis, standards, goals, and policies for Oakland.¹³ Although Oakland has many parks and active recreational facilities, its resources are below its own standards.¹⁴ However, the Office of Parks and Recreation does not currently have regulations requiring in-lieu fees or development impact fees.¹⁵ The following policies apply directly to new development either directly or as indicators of intent:¹⁶

#5 All major new residential, and high density nonresidential, development should provide on-site usable open space for their occupants and, where appropriate, the general public.

#17 Efforts should be made to increase the total acreage of public parks and recreation areas within the city limits, exclusive of facilities at schools, colleges, and universities, to at least 10 acres for each 1,000 of Oakland's population.

#20 Where large-scale residential development occurs on previously open land, the developer should contribute at least 2.5 acres (or the equivalent cost thereof) for public park or recreational use for each 1,000 residents, as adjusted for expected population and housing characteristics. This should be in addition to any land which may be reserved for schools or which may be set aside primarily for scenic or conservation purposes.

There are several parks that are located in the project vicinity. Leona Heights Park is located just south of the site and has hiking trails. Pinto Recreation Area is located just east of the site; it contains Owen C. Jones Field which is used for softball and soccer, as well as a blacktop area which is part of Carl Munck Elementary School. McCrea Park is located southwest of the site across Highway 13, and contains two fishing ponds which are stocked with trout. These three parks are operated by the City of Oakland and are unsupervised.

The Redwood Heights Recreation Center, located northwest of the project site across the Warren Freeway and the Redwood Heights Elementary School and an old house from which after-school and tiny-tot recreation programs, are also operated near the project site. A full-time director is

responsible for this program. Regional parks, including Joaquin Miller Park, Redwood Regional Park and Huckleberry Regional Preserve, are located to the east of the project site. Additional recreational facilities, including tennis courts and a swimming pool, are located at the College of Holy Names just north of the site. The community can use these facilities by enrolling and paying a fee for tennis and swimming classes.¹⁷

IMPACTS AND MITIGATION MEASURES

Impact

4.7.4-1 The proposed project would increase the demand on park and recreation resources of the City of Oakland.

The proposed project would have an impact on the park and recreation resources of the City of Oakland. The project would add residents to the City’s population which would increase demand for and usage of City park and recreational resources that already do not meet the City’s goals and standards.¹⁸ The proposed project would increase demand for park and recreational resources approximately 0.03% on average over current demand, equivalent to the project’s percentage increase in population since park and recreational needs are measured in terms of population.¹⁹

Since the City assesses it’s park and recreational resources as below standard, a project’s minimum impact can be measured by it’s proportional share of the total park and recreational acreage goals contained in the Open Space, Conservation and Recreation Element of the Oakland Comprehensive Plan (OSCAR; policy #18 in the setting section above). The project’s impact in terms of the City’s target goal of 10 total acres of park and recreational acreage per 1,000 residents would amount to the need for 0.96 or approximately one acre of additional, developed park and recreational land. The project’s impact in terms of policy #20 specified for large-scale developments is less, at 2.5 acres per 1,000 residents. Project impacts in these terms would amount to 0.24, or approximately one-quarter acre.

As part of the overall permitting process, the proposed project would be required to apply for a Planned Unit Development (PUD) permit. According to Section 7805 of the Oakland Zoning Code, "the City Planning Commission or, on appeal, the City Council may, as a condition of approval of any development for which a [PUD] permit is required by Section 7802, require that suitable areas for schools, parks, or playgrounds be set aside, improved, and dedicated for public use, or be permanently

reserved for the owners, residents, employees, or patrons of the development." In addition, Section 9407(c) requires "That the development will be well integrated into its setting, will not require excessive earthmoving or destroy desirable natural features, will not be visually obtrusive and will harmonize with surrounding areas and facilities, will not substantially harm major views for surrounding residents, and will provide sufficient buffering in the form of spatial separation, vegetation, topographic features, or other devices."

Mitigation Measure

- 4.7.4-1 Therefore, to satisfy the City PUD zoning standards to mitigate significant park and recreational impacts, the project sponsor should mitigate the proposed project's park and recreational impact by one of the following options:
- The project sponsor should provide a 0.25 acre tot lot, play area, or mini-park in or near the Oakcrest project; or
 - The project sponsor should provide in-cash or in-kind resources of equivalent value to the resource costs as mutually agreed between the project sponsor and the Office of Parks and Recreation, to enhance the Pinto Recreation Area.

4.7.5 WATER SUPPLY AND DISTRIBUTION

SETTING²⁰

The water supply for the area is under the jurisdiction of the East Bay Municipal Utility District (EBMUD). Water is supplied from the 68.4-billion-gallon Pardee Reservoir on the Mokelumne River in the Sierra Nevada. Principal storage within the City is at the 154-million-gallon Central Reservoir, located at the eastern terminus of East 30th Street at 23rd Avenue. Approximately 105 million gallons per day (mgd) are consumed in the City of Oakland. Per capita consumption is about 205 gallons per day (gpd). EBMUD anticipates some growth within its largely built-out district due to infill as outlined in its Water Management Plan (February 1991) and plans accordingly to meet its supply responsibilities.

The project site is served from EBMUD's Joaquin Miller Pressure Zone. Adjacent to the project site, there is a 12-inch water main under Crestmont Drive and a six-inch water main under Redwood Road running slightly beyond the project site past the intersection with old Redwood Road.

IMPACTS AND MITIGATION MEASURES

Impact

- 4.7.5-1 **The existing distribution system capacity in the vicinity of the project may be insufficient to serve the proposed project's domestic needs and the Fire Department's fire flow requirements (1500 gallons per minute with 20 pounds of residual pressure in the main).**

Based on EBMUD's average water consumption rate of 400 gallons per day per dwelling unit, the project would generate an average net water consumption of about 12,800 gallons per day. This would increase water consumption city-wide by 0.01% and would not constitute a significant water supply impact.

EBMUD has identified potential water distribution system capacity limitations regarding the existing infrastructure in the project vicinity. As is standard practice with new water service hook-ups, EBMUD would conduct a hydraulic analysis of the distribution system that would serve the proposed project at such time that sufficient details are available.²¹ Extensions of lines to the project site as well as the need for any upgrades to the system for adequate domestic water service or fire flow would be determined at that time and executed subsequently. The project's principal demand could best be served by connections to the Crestmont Drive main.²²

Mitigation Measure

- 4.7.5-1 The project sponsor would be required to cover the cost of any system improvements required to serve the proposed project as determined by a hydraulic analysis prepared by EBMUD.²³
- 4.7.5-2 EBMUD guidelines for water use during water shortages encourage applicants for new water service connections to agree to landscaping restrictions. It is suggested that the project sponsor work with EBMUD to develop residential units that are equipped with modern water conserving appliances and landscaping.

4.7.6 SANITARY SEWER SERVICE

SETTING

The City of Oakland provides sanitary sewer service to the project area and maintains the collection lines; EBMUD provides sewage treatment service. Sewage generated in the project vicinity is

collected in City lines and transported to EBMUD interceptor lines which then transport sewage to the treatment plant near the intersection of Interstates 80 and 580. Existing eight-inch lines extend along Redwood Road close to the project boundary. The lines continue up Crestmont Drive and eventually hook up with the EBMUD interceptor lines.

The EBMUD sewage treatment facility provides primary and secondary treatment. The plant is designed to accommodate 290 million gallons per day (mgd) primary treatment and 168 mgd secondary treatment. During the dry season, this is sufficient to handle the average flows of 75 mgd, but the system cannot accommodate peak flows experienced during the wet-weather periods.

In 1986, EBMUD completed an infiltration and inflow study which recommended necessary improvements to the existing wastewater collection and treatment system to handle wet-weather flow. EBMUD's recently completed facility plan includes \$160 million of improvements which would be constructed in 12 phases over the next six years. The phase of the improvement program that would correct the existing wet-weather overflow problem should be completed by November of 1992.²⁴ The improvements provide treatment capacity for a 10-15 year design storm of 415 mgd peak wet weather flows, along with primary treatment of 320 mgd, and secondary treatment of 168 mgd (average dry weather flow).²⁵

IMPACTS AND MITIGATION MEASURES

There would be no significant sewer service or distribution infrastructure impacts. The eight-inch line which extends along Redwood Road and Crestmont Drive should have sufficient capacity to serve the proposed project.²⁶ Extensions of sewage lines to the project site itself, as well as any improvements that might be required once the project details are developed and a field study is made, would be the responsibility of the project sponsor.²⁷ The project sponsor would be required to contribute to the cost of any necessary infrastructure improvements after final sewer and sewer tie-in plans for the project are approved by the Office of Public Works.

EBMUD's sewage treatment plant has adequate dry-weather capacity to process sewage generated by the project. Peak wet-weather flows would exceed the plant's current treatment capacity. However, upon completion of the current improvement program which would occur prior to the project coming on-line, the treatment plant would have adequate capacity to serve peak wet-weather flows.²⁸ EMBUD's treatment plant would be able to handle project flows within capacity.

Mitigation Measure

None required.

4.7.7 SOLID WASTE

SETTING

The City of Oakland contracts with the Oakland Scavenger Company to provide solid waste service to the City of Oakland. Solid waste collected from the project vicinity is transported by truck to the Solid Waste Transfer Station in San Leandro and then transported to the Altamont Landfill just east of Livermore. The Altamont Landfill currently has an estimated fill capacity of 33 years.

IMPACTS AND MITIGATION MEASURES

Project residents would generate approximately 42 tons per year of solid waste, which would represent a 0.03 percent increase over existing conditions.²⁹ This would not constitute a significant solid waste collection or disposal impact. The Oakland Scavenger Company would serve the proposed project with its standard user charges. The Alameda County Solid Waste Management Plan is currently being revised toward increasing the Altamont Landfill's lifetime capacity by 17 years, achieving a 50 year total lifetime capacity.

The City of Oakland does not have a City-wide recycling program. A buy-back recycling center exists at the San Leandro transfer station and there are community-based recycling centers in Oakland and surrounding communities.

Mitigation Measure

None required.

1. City of Oakland, Dunsmire Heights Project Final EIR, September 1991, prepared by Wagstaff and Associates, p. 364.

2. Assistant Fire Chief Don Matthews, Oakland Fire Department Fire Alarm Dispatch Center, telephone conversation, February 26, 1992.

3. City of Oakland, Dunsmire Heights Project Final EIR, op. cit.

4. Bill McGowan, EBMUD Facilities Planning, personal communication, January 14, 1992.
5. Al Nero, Assistant Chief of Support Services, Oakland Fire Department, personal communication, January 15, 1992.
6. Assistant Fire Chief Don Matthews, Oakland Fire Department Fire Alarm Dispatch Center, telephone conversation, February 26, 1992.
7. Bill McGowan, EBMUD Facilities Planning, personal communication, January 14, 1992.
8. Robert Nichelini, Deputy Chief, Oakland Police Department, personal communication, January 14, 1992.
9. Tom Freddette, Research Specialist, Oakland Unified School District (OUSD) Research and Evaluation Department, personal communication, July 8, 1991. October data are used by OUSD Research and Development as baseline data.
10. Tabashi Nakadegawa, Planning Department, Oakland Unified School District, personal communication, January 14, 1992.
11. The State Board of Education's state-wide student generation rates are 0.4 elementary school students per dwelling unit, 0.1 junior high school students per dwelling unit, and 0.2 high school students per dwelling unit.
12. Tom Freddette, Op. cit.
13. City of Oakland, Open Space, Conservation and Recreation, An Element of the Oakland Comprehensive Plan, June 1976.
14. Ibid, p. 41.
15. Cleve Williams, Assistant Director, Office of Parks and Recreation, City of Oakland, letter of January 24, 1992.
16. Ibid, pp 54-55.
17. City of Oakland, Montebello Terrace Subdivision Draft EIR, October 1987.
18. Cleve Williams, Op. cit.
19. Assuming an average of 3 persons per household for the 32 three bedroom units of the proposed project, project population would be 96 residents. The 1991 population of the City of Oakland is 376,661 (California State Department of Finance, Report E-5). The resulting project related population increase would be 0.03%.
20. Bill McGowan, EBMUD Facilities Planning, personal communication, November 21, 1988, and January 14, 1992.
21. Ibid.

22. Ibid.
23. Bill McGowan, Op. cit.
24. Tom Selfridge, Sr. Civil Engineer, EBMUD, personal communication, January 14, 1992.
25. Ibid.
26. Ken Wong, City of Office of Public Works, personal communication, January 14, 1992.
27. Ibid.
28. Ibid.
29. Residential solid waste generation factor of 0.44 tons per year per resident. Estimated residential population of 96 assumes three persons in each of the 32 three bedroom units of the proposed project. Solid waste generation factor from California Solid Waste Management Board, Bulletin No. 2: Solid Waste Generation Factors in California, Sacramento, July 1974.

4.8 ENERGY

SETTING

The Pacific Gas and Electric Company (PG&E) supplies both natural gas and electricity to customers in Oakland, and would service the proposed project. PG&E generates electrical energy from various sources including oil, natural gas, wind, cogeneration, solid waste, hydroelectric, geothermal and nuclear power.¹

To minimize energy demand increases, new buildings in California are required to conform to stringent energy conservation standards for space conditioning and residential water heating as specified in Title 24 of the California Code of Regulations. These articles of the Code require inclusion of state-of-the-art energy conservation features in building design and construction. The State allows developers to comply with the standards via the component performance standards method, which requires that a project sponsor do one of the following: incorporate into the building a set of specific energy-conserving design features, use renewable energy resources, or demonstrate that the building(s) would comply with a specified "energy budget"; that is, consume no more than a certain quantity of energy that is specified for different types of building uses. Documentation showing compliance with standards is submitted with the application for the building permit and the standards would be reviewed and enforced by the City of Oakland's Office of Public Works. Transportation energy and construction energy are not regulated by Title 24 or any other standards.

The project site is currently undeveloped and does not generate a demand for energy.

IMPACTS AND MITIGATION MEASURES

Energy impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

Impact

- 4.8-1 **The project would increase the consumption of nonrenewable energy resources during project construction and operation. Project-generated motor vehicle traffic would consume gasoline, oil and diesel fuel during transportation of residents to and from the project site.**

Construction

Site preparation and development, including tree removal, would require unknown amounts of energy, but is not expected to be of significant levels. The total estimated energy usage for proposed project construction would be 16.6 billion Btu.² This estimate includes gasoline, diesel fuel and electricity for fabrication and transportation of building materials, worker transportation, site development and building construction.³

Operation

Table 4.8-1 estimates the project's maximum allowable annual operational energy in accordance with Title 24 regulations. Natural gas and electricity requirements have been converted to at-source Btu in order to account for energy losses occurring during generation, transmission and distribution of the various forms of energy.⁴ The project's maximum allowable annual energy consumption under Title 24 would be about 108.6 billion Btu, the equivalent of about 19,393 barrels of oil. Because PG&E does not foresee any difficulty in supplying the proposed project with sufficient natural gas and electricity, this is not considered to be a significant impact.⁵

Project-related automobile transportation would cause additional off-site energy consumption. For the project trip generation described in Section 4.5, Traffic and Circulation, project-related trips would require about 28,772 gallons of gasoline per year.⁶ Converted to a common thermal energy unit, this gasoline use would equal about 4,028 million Btus per year, the energy equivalent of 720 barrels of oil. The projected use is based upon the mix of highway vehicles in California in 1990. An additional undetermined amount of transportation-related energy consumption would arise from project-related use of local transit systems. This projected energy use is not considered to be a significant impact.

TABLE 4.8-1
ANNUAL PROJECT ENERGY USE

<u>Land Use</u>	<u>Developed Space</u>	<u>Title 24 Allowance</u>	<u>Total Natural Gas (Therms)¹</u>	<u>Total Electricity (kWh)²</u>	<u>Peak Electrical Load (kWh)</u>	<u>Total³ Operating Energy (million Btu)</u>
I. PROJECT OPERATION						
Single-Family Residences	15 DUs	20,800 Btu/sq. ft. plus 2,800,000 Btu/DU (water heating)	3,000 520,000	241,000	800	2,800 52,000
Town Houses	17 DUs	20,800 Btu/sq. ft. plus 2,800,000 Btu/DU (water heating)	2,000 520,000	159,000	500	1,800 52,000
SUBTOTAL OPERATION ENERGY			1,045,000	400,000	1,300	108,600

II. TRANSPORTATION

28,772 gallons of gasoline and diesel fuel consumed per year 4,028

SUBTOTAL TRANSPORTATION ENERGY (million Btu)

III. CONSTRUCTION	TOTAL CONSTRUCTION ENERGY (million Btu)	ANNUALIZED CONSTRUCTION ENERGY OVER 50 YEARS (million Btu)
Dwelling Units	15,424	310
Roadway Improvements	<u>1,200</u>	<u>20</u>
SUBTOTAL CONSTRUCTION ENERGY	16,624	330

IV. PROJECT TOTAL 112,958

¹ Assumes 10% of total Btu's would be generated with natural gas.

² Assumes 90% of total Btu's would be generated with electricity and compensates for energy loss from point of generation to site

³ Includes maximum allowable for space conditioning and water heating under Title 24 plus a factor for electrical usage for lighting and equipment which does not fall under Title 24 limitations.

Mitigation Measures

Statutory Requirements

- 4.8-1 The project sponsor is required by law to demonstrate compliance with the stringent standards of the California Administrative Code, Title 24, prior to issuance of a building permit.

New buildings also must comply with requirements of the Uniform Building Code regarding insulation, glazing, weather sealing, choice of building materials and water and energy conserving plumbing fixtures. A number of design features that would aid the project in achieving compliance with Title 24 standards are listed below.

Features not specifically required by Title 24 and not included in the project proposal could be included as part of the project to further reduce energy consumption.

Architectural

- The site generally slopes up to the northwest leaving maximum solar exposure to the south and southeast. This is an ideal exposure for using passive solar energy design to reduce heating and cooling energy demands.
- Reduce window surfaces on the north face to minimize heat loss.⁷
- Minimize exterior surface area through the architectural design.
- Use landscaping design to enhance passive solar energy efficiency and reduce the wind on the surface of the buildings.
- Use of building overhangs or other horizontal sun shades to shade the south faces of the buildings to reduce cooling loads while maintaining glass area that would provide significant daylight contribution for reducing artificial lighting demands.
- Windows facing east and west should be either recessed or use vertical sun shades to provide sun shading while maintaining a glass area that would provide a significant daylight contribution for reducing artificial lighting demands.
- Use heat-reflecting glazing on windows that are not shaded.

Electrical

- Use miniature fluorescent lamps to replace incandescent lamps in fixtures where possible.

- Use energy efficient high pressure sodium lighting for roadways, walkways, etc., with timeclock or photocell control.
- Glass orientation, reflective treatments and shading devices.

1. PG&E, *Annual Report*, San Francisco, 1981.

2. The British thermal unit (Btu) is the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at sea level; all references to Btu in this EIR are at-sources values. The term "at-source" means that adjustments have been made in the calculation of the thermal energy equivalent (Btu) for losses in energy that occur during generation, transmission, and distribution of the various energy forms as specified in: ERCDC, 1977, *Energy Conservation Design Manual for New Non-Residential Buildings*, Energy Conservation and Development Commission, Sacramento, California, and Apostolos, J.A., W.R. Shoemaker, and E.C. Shirley, 1978 *Energy and Transportation System*, California Department of Transportation, Sacramento, California, Project #20-7, Task 8.

3. Hannon, B. et al., "Energy and Labor in the Construction Sector," *Science*: 202:837-847.

4. The term "at-source" means that adjustments have been made in the calculation of the thermal energy equivalent (Btu) to account for losses in energy that occur during generation, transmission and distribution of electrical energy. See Apostolos, J.A., W.R. Shoemaker and E.C. Shirley, *Energy and Transportation System*, California Department of Transportation, Sacramento, California, Project #20-7, Task 8, 1978.

5. Telephone conversation, Fel Aug, Planning District Manager, PG&E, August 4, 1988.

6. The California Air Resources Board's (CARB's) URBEMIS#1 computer model was used for estimating vehicular fuel use. This model is based on the following assumptions: 27.3 percent of daily trips are home/work trips, with an average trip length of 9.6 miles; 21.2 percent of daily trips are home/shop trips, with an average trip length of 3.7 miles; and 51.5 percent of daily trips are home/other trips, with an average trip length of 5.3 miles. The proposed project is expected to generate 240 daily trips, with an average trip length of 6.1347 miles, and an average ratio of 18.70 miles/gallon.

7. Edward Mazria, *The Passive Solar Energy Book*, Rodale Press, Emmaus, Pa., 1979.

Additional Reference Material Used:

Bay Area Air Quality Management District, *Air Quality and Urban Development: Guidelines for Assessing Impacts of Projects and Plans*, San Francisco, November, 1985.

Rau and Wooten, *Environmental Impact Analysis Handbook*, McGraw Hill, 1980.

4.9 NOISE

SETTING

Ambient noise in the project vicinity is typical of noise levels in the predominantly residential Oakland hills, which is dominated by vehicular traffic on Redwood Road and Crestmont Drive, including trucks, cars, buses and emergency vehicles. Vehicular noise emanating from Highways 13 and 580, which intersect less than one mile from the site, is also noticeable. The Noise Element of the Oakland Comprehensive Plan indicates an average noise level of 65 DBA L₁₀ in 1973 within 50 ft. of Highway 13.^{1,2} (See Appendix E for a table of typical noise levels found in the everyday environment.)

The project site itself is currently undeveloped and does not contain noise sources. To the south of the project site, across Redwood Road, is the Pinto Recreation Area, which is used for recreational activities on weekends and evenings in the spring and summer. Noise from these activities is noticeable to surrounding residents. To the south of the Pinto Recreation Area is the Carl Munck Elementary School; the sound of children playing during school hours is also noticeable to nearby residents. Noise levels associated with these facilities would be less than 45 Db, which is considered relatively quite and not disruptive.

Title 24 of the California Government Code of Regulations establishes uniform insulation standards for residential projects. The Oakland Office of Public Works would review the final building plans to insure that the building wall and floor/ceiling assemblies meet state standards regarding sound transmission. In addition, Title 24 requires that interior community noise equivalent levels (CNEL) with windows closed, attributable to exterior sources shall not exceed an annual CNEL of 45 Db in any habitable room.

IMPACTS AND MITIGATION MEASURES

Project operation would not result in perceptibly greater noise levels than those existing in the area. The project would generate about 34 additional p.m. peak hour vehicle trips than presently occur on the site. The amount of traffic generated by the project during any hour of the day, in addition to estimated cumulative traffic increases at the time of project completion, would cause traffic noise levels to increase by one DBA or less. To produce a noticeable increase in environmental noise, a

doubling of existing traffic volume would be required; traffic increases of this magnitude would not occur with anticipated cumulative development including the project.³

Construction noise impacts identified for the proposed project are set forth below. Unless otherwise noted, all identified impacts are considered to be significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, would be sufficient to reduce impacts to less than significant levels.

Although not required by CEQA, some less than significant adverse impacts are discussed because they are general issues of concern. While no mitigation is required by CEQA, in some cases mitigation measures are proposed that would further reduce the level of impact. This type of impact is identified in the text.

Impact

- 4.9-1 **Construction of the proposed project would take place over a period of between 24 and 30 months, and would temporarily increase noise levels in areas surrounding the project site. The nearest sensitive noise receptors are residences across Crestmont Drive, about 80 feet from the lower portion of the site.**

Construction noise levels would fluctuate depending on construction phase, equipment type and duration of use, distance between noise source and listener, and presence or absence of barriers between noise source and listener. To estimate probable noise impacts, this analysis assumes typical equipment and construction techniques. Table 4.9-1 shows typical exterior noise levels associated with the several types of construction equipment. Interior noise levels at 50 ft. from the noise source would be about 10 to 15 DBA less than those shown in Table 4.9-1.⁴ Closed windows would reduce interior noise levels by about 20 DBA below the exterior noise levels shown in Table 4.9-1.

The project sponsor proposes a cast-in-place pier foundation, which would not require the use of piledriving. This method of engineering would also serve to reduce noise levels associated with construction.

TABLE 4.9-1
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS
AT 50 FT. FROM SOURCE (DBA)¹

<u>Equipment Type</u>	<u>Without Noise Control</u>	<u>With Feasible Noise Control²</u>
Earthmoving:		
Front Loaders	79	75
Backhoes	85	75
Dozers	80	75
Tractors	80	75
Scrapers	88	80
Graders	85	75
Trucks	91	75
Pavers	89	80
Materials Handling:		
Concrete Mixers	85	75
Concrete Pumps	82	75
Cranes	83	75
Derricks	88	75
Stationary:		
Pumps	76	75
Generators	78	75
Compressors	81	75
Impact:		
Pile Drivers	101	95
Jack Hammers	88	75
Rock Drills	98	80
Pneumatic Tools	86	80
Other:		
Saws	78	75
Vibrators	76	75

¹ Taken from Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, prepared by Bolt, Beranek, and Newman for the U.S. Environmental Protection Agency, December 31, 1971.

² Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.

Noise levels greater than 60 DBA can interfere with normal speech and concentration. Noise levels greater than 70 DBA would require nearby residents to close windows or shout to communicate. General stress reaction has been observed in humans exposed to brief sounds of 75 DBA.⁵ At noise levels of 85 DBA, normal conversation is extremely difficult, and sleep or rest virtually impossible. Intermittent noises, such as pile driving noise, have a psychological effect on humans: they reduce perception of control over the environment. This perceived loss of control frequently results in a depressed mood and depressed motivation. High noise levels also can lead to physiological effects, such as elevated blood pressure.⁶ Repeated impulse and intermittent sounds of high level appear more likely to be disruptive than continuous or steady sounds of comparable level.⁷

In the vicinity of the project site, the nearest sensitive noise receptors are residences located on the west side of Crestmont Drive, about 80 feet from the lower portion of the site. Approximately 100 feet from the lower portion of the site is the Carl Munck School, another sensitive noise receptor. Table 4.9-1 indicates typical construction noise levels at 50 feet from the source; noise attenuation of approximately six dBA occurs at every doubling of distance from the source. Therefore, noise levels at the closest residences would be about 63-68 dBA with windows open, and about 58 dBA with windows closed; noise levels at the Carl Munck School would be about 59-64 dBA with windows open, and about 54 dBA with windows closed.

In summary, during the majority of construction activity, noise levels would be above existing levels in the project area. There would be times, particularly during the operation of impact wrenches, when noise would interfere with indoor activities in nearby residences, the Carl Munck School and open space areas adjacent to the project site. These impacts would be temporary in nature and limited to the period of construction.

Mitigation Measure

- 4.9-1 During project construction, the operation of heavy equipment should be limited to the daytime weekday working hours (8:00 a.m. to 5:00 p.m.) to minimize potential noise disturbances to adjacent residents. Stationary noise sources should be enclosed and as far from adjacent residences as possible. Require the contractor to muffle and shield intake and exhausts. Construction vehicles should be well muffled and maintained, and all equipment including impact tools should be fitted with effective mufflers, shrouds or shields. Construction equipment noise, except that of impact tools, should be limited to 85 dBA at 100 feet.

The project sponsor should meet with the Office of Public Works prior to the start of construction to determine an appropriate construction schedule to minimize construction noise impacts on the surrounding neighborhood.

1. L_{10} is a percentile measurement of sound level, indicating the sound level exceeded 10 percent of the time.
2. A decibel (Db) is a logarithmic unit of sound energy intensity. Sound waves, traveling outward from a source, exert a force known as sound pressure level (commonly called "sound level"), measured in decibels. A DBA is a decibel corrected for the variation in frequency response to the typical human ear at commonly encountered noise levels. Noise levels presented in this section are given in DBA, L_{eq} . L_{eq} , the energy-equivalent noise level, is the equivalent continuous noise level which, in a stated period, would contain the same acoustic energy as the actual time-varying sound level measured during the same period.
3. Increases of one DBA or less in environmental noise are not noticeable by most people outside a laboratory situation (National Academy of Sciences, Highway Research Board, Research Report No. 117, 1971). See also Federal Highway Administration Highway Traffic Noise Prediction Model Report No. 77-108, December 1978, p. 8., regarding doubling of traffic volumes producing increases of three DBA or more, which are noticeable to most people.
4. United States Department of Transportation, Federal Highway Administration, *Policy and Procedure Memorandum 90-2*, February 8, 1973.
5. The Central Institute for the Deaf, *Effects of Noise on People*, U.S.EPA, 1971.
6. Cohen, Sheldon et al., "Cardiovascular and Behavioral Effects of Community Noise," *American Scientist*, Vol. 69, October 1981.
7. National Institute for Occupational Safety and Health, U.S. Department of Health, Education and Welfare. *Occupational Exposure to Noise*, 1972.

5. GROWTH INDUCEMENT

Growth-inducing effects can occur when the municipal services or infrastructure is extended to undeveloped areas, or new major employment opportunities are created.

The project would introduce to a currently undeveloped site 17 detached single-family homes on the upper portion of the site, 15 townhouse units, contained in seven structures, on the lower portion of the site, and two new cul-de-sac access roads. Directly to the north and east of the site are continuations of the currently undeveloped hillside. The overall setting of the project area, however, is urban. The land use and zoning designations for the project site and the adjacent sites allow the type and scale of residential development proposed, and no expansion to the municipal infrastructure not already under consideration would be required to accommodate new development due to, or induced by, the project.

If developed successfully, the project could have growth-inducing effects, primarily to the two adjacent undeveloped properties, by demonstrating the viability of residential development on this hillside. Development of adjacent properties, however, would be subject to environmental constraints unique to those sites, and would require its own environmental impact assessment. Residential development in the project area would incrementally contribute to continued growth of local and regional markets for housing, goods and services.

The project does not proposed creating major employment opportunities.

6. UNAVOIDABLE SIGNIFICANT ADVERSE IMPACTS

In accordance with Section 21067 of the California Environmental Quality Act (CEQA), and with Sections 15040, 15081 and 15082 of the State CEQA Guidelines, the purpose of this chapter is to identify impacts that could not be eliminated or reduced to an insignificant level by mitigation measures included as part of the proposed project, or by other mitigation measures that could be implemented, as described in Chapter 4, Environmental Setting, Impacts and Mitigation Measures.

The findings of significant impacts are subject to final determination by the City Planning Commission as part of its certification process for the EIR. This chapter in the Final EIR will be revised, if necessary, to reflect the City Planning Commission's findings.

The proposed project would have the following significant adverse impacts:

- Removal of up to one-half of the mature oak trees found on the lower portion of the site.
- If some of the oak trees are preserved on the knoll area where the cul-de-sac is proposed, the "bulb" cul-de-sac would be inaccessible to emergency vehicles.
- Conversely, if the oak trees located where the cul-de-sac is proposed are pruned as a mitigation measure to permit vertical access for emergency vehicles, the viability and health of the oak trees may be significantly damaged.

7. ALTERNATIVES TO THE PROPOSED PROJECT

This chapter identifies alternatives to the proposed project, discusses environmental impacts associated with each alternative, and gives the sponsor's reasons that the alternatives were rejected in favor of the project. The City of Oakland City Planning Commission could approve an alternative instead of the proposed project if the Commission believed the alternative would be more appropriate for the site.

7.1 ALTERNATIVE ONE: NO PROJECT

DESCRIPTION

This alternative would involve no change to the site. The proposed project would not be built. This alternative would preserve the option to develop the project site in the future with a larger or smaller development.

IMPACTS

Under this alternative, none of the impacts associated with the proposed project would occur. The environmental characteristics of this alternative would be generally as described in the Environmental Setting sections contained in Chapter 4, Environmental Setting, Impacts and Mitigation Measures.

The proposed project site would remain in an undeveloped, unimproved condition. There would be no change to the topography of the site, and drainage patterns would not be altered. Under this alternative, none of the trees on the site would be removed; the proposed project would require removal of up to one-half of the coast live oak trees present on the site. This alternative would also not disturb the wildlife species which are currently found on the site. Under this alternative, as with the proposed project, no rare or endangered plant or animal species would be displaced, and the serpentine habitat area which is potential habitat for the Presidio Clarkia would be left undisturbed.

Under this alternative, the conversion of an undeveloped open hillside to residential use would not occur, as it would with the proposed project.

The free-flowing operation of the Redwood Road/Crestmont Drive intersection would remain under this alternative. An on-site parking deficit of five spaces would not occur, as it would with the project. There would be no change in energy demand on the site.

Visual impacts associated with the proposed project would not occur under this alternative. The project site itself, and in conjunction with the adjacent properties to the north and east, would remain as a continuous open hillside; the hillside provides a visual counterpoint to the urban development in the local area.

Temporary noise impacts associated with the construction of the proposed project would not occur under this alternative.

The No Project Alternative is considered the environmentally superior alternative because it avoids the environmental effects as identified in the preceding paragraphs. Given that the Oakland Zoning Regulations allows residential development on the site, and similar development has occurred on nearby sites, it is likely that development on the project site could occur at some time in the future. If development is to occur, it must be at a residential density where environmental impacts are or could be mitigated to a level of non-significance.

This Alternative would not use the development potential of the site allowable under the City of Oakland Zoning Regulations, and it is unlikely that all development should or could be restricted on this parcel of land. This environmental document serves to identify all foreseeable environmental impacts and to recommend mitigation measures and project alternatives to reduce the impacts to a level of non-significance.

7.2 ALTERNATIVE TWO: REARRANGED SITE PLAN

DESCRIPTION

This alternative would rearrange the location of units on the site, while maintaining the same density proposed under the project. Some of the townhouse units would be relocated to the upper portion

of the site, replacing detached single-family homes which would be relocated to the lower portion of the site. The purpose of this alternative would be to eliminate the five-space parking deficit the project would create at the lower portion of the site. Several possible reconfigurations could occur that, while maintaining the proposed density, would reduce identified impacts of the project. For the purpose of this discussion, only one of these alternate schemes is discussed: switching the location of units S-13 and S-14 (upper portion of the site) with units T-8, T-9, T-10, T-11, T-12, and T-13 (lower portion of the site). (These units are identified in Figure 3-4, Site Plan.) The upper and lower access roads would generally be the same as those under the proposed project.

IMPACTS

There are, at present, no site plans which depict the rearranged site as described above. For this reason, the discussion of the mitigating effects of this alternative is preliminary. Given that preamble, this alternative would shift the estimated parking demand of the project so that all resident parking demand could be accommodated on-site, including a two-space surplus (see Table 7-1). As with the project, the estimated visitor demand for parking at the lower portion of the site could be accommodated along Crestmont Drive. Some of the daily and peak period vehicle trips generated by the proposed project would be shifted under this alternative. Despite this shift in trip origination/destination, the total number of traffic trips generated by the proposed alternative would be the same as that for the proposed project. Therefore, the existing excess capacity at the Redwood Road/Crestmont Drive intersection would be sufficient to maintain the current LOS A conditions. In year 2000, with this alternative plus cumulative increases in traffic volumes, the study intersection would still operate a LOS A.

This alternative would require that approximately the same number of coast live oak trees be removed as under the proposed project.

This alternative would have impacts similar to the proposed project, as described in Chapter 4 for Land Use and Relationship to Plans and Policies, Soils and Geology, Drainage, Visual Quality, Public Services and Utilities, Energy and Noise. This alternative would accommodate all of the resident parking demand on site.

TABLE 7-1
PARKING COMPARISON

	<u>UPPER PORTION OF SITE</u>			<u>LOWER PORTION OF SITE</u>			<u>Surplus/ Deficit Without Visitor Demand</u>
	<u>Supply</u>	<u>Demand</u>	<u>Surplus/ Deficit</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus/ Deficit</u>	
Proposed Project	66	41	+25	29	38 ¹	-9	-5
Alternative Two	66	46	+20	29	30 ¹	-1	+2

¹ This amount includes resident and visitor demand. Sufficient on-street parking is available along Crestmont Drive to accommodate visitor demand.

Source: EIP Associates

Although this alternative would accommodate all of the resident parking demand on-site, this alternative would still have unavoidable adverse impacts similar to the project concerning loss of significant oak trees.

7.3 ALTERNATIVE THREE: REDUCED UNITS ON LOWER PORTION OF SITE

DESCRIPTION

This alternative would reduce the number of townhouse and single-family units on the lower portion of the site; development of the upper portion of the site would be the same as under the proposed project. Townhouse units T8, T9, T10, T11, T12, and T13, single-family unit S16, and the terminus portion of the lower access road (shown in Figure 3-4, Site Plan), would be eliminated from the project. The lower access road would be an approximately 125-foot cul-de-sac. The purpose of this alternative would be to limit alteration of the oak knoll located at the southwesternmost portion of the site, and reduce the number of mature coast live oak trees removed as part of the project. In addition, this alternative would allow the development of a tot-lot or some other recreational open space feature on the knoll.

IMPACTS

At the upper portion of the proposed site, this alternative would have the same environmental effects as the proposed project (described in Chapter 4).

The effects of this alternative on the lower portion of the site would be reduced compared to the proposed project. This alternative would include seven townhouse units in three clusters, compared to 16 townhouse units in seven clusters and on detached single-family house under the proposed project. The 30 mature coast live oak trees located on the oak knoll would be retained, and would not require extensive pruning. Potential root damage associated with construction of the eliminated units would not occur. This alternative would require the removal of brush, minor tree pruning some minor grading of the oak knoll adjacent to Crestmont Drive, to provide acceptable minimum sight distances for vehicles exiting the site from the proposed lower access road. This alternative would also allow development of a recreational open space feature such as a tot-lot on the oak knoll.

This alternative would have the same on-site parking requirement, demand, supply and surplus at the upper portion of the site as the proposed project. However, as shown in Table 7-2, the lower portion of the site would have reduced the parking deficit from -5 to -2.

This alternative would reduce visual impacts compared to the proposed project, particularly from lower vantage points. Views of the lower portion of the site from Redwood Road below Crestmont Drive, and along Crestmont Drive between Redwood Road and Samaria Lane, would be primarily of the undeveloped oak knoll; under the proposed project, the oak knoll from these vantages would have fewer trees and prominent townhouses. This alternative would allow the placement of a tot-lot or some other open space use in the knoll area to reduce the park and recreation impact identified for the proposed project.

Environmental effects related to public services and utilities, energy, and construction noise would all be slightly reduced under this alternative, compared to the proposed project.

The feasibility of this alternative must be evaluated in light of CEQA Section 21085, which stipulates that the decision-making body should never reduce the proposed number of housing units in a project as a mitigation measure or project alternative whenever another feasible specific measure or alternative could provide a comparable level of mitigation.

TABLE 7-2
PARKING COMPARISON, LOWER PORTION OF SITE

	<u>Code Required</u>	<u>Supply</u>	<u>Demand¹</u>	<u>Surplus/ Deficit</u>	<u>Surplus/ Deficit Without Visitor Demand</u>
Proposed Project	26	29	38	-9	-5
Alternative Three	11	12	15	-3	-2

¹ This amount includes resident and visitor demand. Sufficient on-street parking is available along Crestmont Drive to accommodate visitor demand.

Source: EIP Associates.

8. EIR AUTHORS AND PERSONS CONSULTED

EIR AUTHORS

City Planning Department

Alvin D. James, Director of City Planning
Charles S. Bryant, Environmental Review Coordinator
Nixon Lam, Assistant Environmental Planner
Stanley Muraoka, Assistant Environmental Planner
Karen Howard, Assistant Planner

EIR CONSULTANTS

EIP Associates

Stu During, Principal
Steven Appleton, Project Manager
Ed Minister, Planning Analyst
George Burwasser, Geologist
Ric Villasenor, Biologist
Barry Anderson, Botanist
Ted Adams, Landscape Architect
Alan Lyons, Production
Janet Fong, Graphics
Kathryn Mortimer-Garcia, Energy Analyst

Thomson Engineers, Traffic and Circulation

Eugenie Thomson

DKS Associates, Traffic and Circulation

Mark Spencer

Wilson Engineering Company, Traffic and Circulation

John Wilson

PROJECT SPONSOR

Mr. Frank Albanese, Property Owner

Behzad Afsari, Project Representative

Collaborative Design Architects

Jim Burns, Project Manager

PERSONS CONSULTED

Willie Yee, City Planning Department, City of Oakland

I. Jeeva, Traffic Engineering and Parking Division, City of Oakland

Lawrence Tai, Traffic Engineering and Parking Division, City of Oakland

W. Boyd, Supervising Civil Engineer, Office of Public Works, City of Oakland

Mr. Sigwart, Oakland Fire Department, City of Oakland

Bill McGowan, EBMUD Facilities Planning

Tom Selfridge, Senior Civil Engineer, EBMUD

Dann Kimm, EBMUD Wastewater Planning

Tom Freddette, Research Specialist, Research and Evaluation Department, Oakland Unified School District

Mike Crosotti, Oakland Scavenger Company

Mr. Perata, Oakland Scavenger Company

Fel Aug, Planning District Manager, PG&E

Nancy Elbing, Customer Representative, PG&E

Ken Wong, Supervising Engineer, Office of Public Works, City of Oakland

Jack Wong, Supervising Engineer, Office of Public Works, City of Oakland

Mike Vecchio, Traffic Engineering and Parking Division, City of Oakland

Don Matthews, Assistant Chief, Oakland Fire Department

Mike Mullen, Engineer, Oakland Fire Department

Al Nero, Chief of Support Services, Oakland Fire Department

Robert Nichelini, Deputy Chief, Oakland Police Department

Tom Freddette, Research Specialist, Oakland Unified School District Research and Evaluation Department

Tabashi Nakadegawa, Oakland Unified School District Planning Department

Cleve Williams, Assistant Director, Office of Parks and Recreation, City of Oakland

APPENDICES

- A. Initial Study
Notice of Preparation (NOP) and Responses
- B. Geotechnical Investigation
- C. Biological Resources
- D. Traffic and Circulation
- E. Typical Noise Levels

APPENDIX A

INITIAL STUDY
&
NOTICE OF PREPARATION (NOP)
AND RESPONSES

File No. ER88-37
 Ref. No. PHD 88-367

City of Oakland
 Oakland, California

INITIAL STUDY
California Environmental Quality Act

I. **DESCRIPTION OF THE PROJECT:** "Oakcrest Planned Unit Development", a 32-unit residential development, including 16 single family units and 16 cluster units on a four acre site near the intersection of Redwood Road and Crestmont Drive. Project includes a new dead-end street about 500 feet long off of Redwood Road, and a driveway about 250 feet long off of Crestmont Drive.

II. **DESCRIPTION OF THE ENVIRONMENTAL SETTING:**

The site is presently undeveloped, open hillside land. Similar open land lies to the east and west. Single-family residential development is to the north and further to the west. Further to the east is the Oakland Hills Tennis Club. Across Crestmont Drive is single-family and townhouse residential development. Across Redwood Road is the Pinto Recreation Area and single-family residential development.

III. **ENVIRONMENTAL EFFECTS**

Geophysical. Will the proposal result in:

1. Unstable earth conditions, including erosion or slides, or changes in geologic substructures either on or off the site?
2. Major changes in topography or ground surface relief features?
3. Construction on loose fill on other unstable land which might be subject to slides or liquefaction during an earthquake?
4. Construction within one quarter mile of an earthquake fault?
5. Substantial depletion of a nonrenewable natural resource or inhibition of its extraction?

Air and Water. Will the project result in:

6. Substantial air emissions, deterioration of ambient air quality or the creation of objectionable odors?
7. Substantial degradation of water quality?
8. Changed drainage patterns or increased rates or quantities of surface water runoff?
9. Interception of an aquifer by cuts or excavations?

Biotic. Will the project:

10. Reduce the quantity of fish and wildlife in the project vicinity, interfere with migratory or other natural movement patterns, degrade existing habitats or require extensive vegetation removal?
11. Reduce the numbers of any rare or endangered species of plants or animals?

Land Use and Socio-Economic Factors. Will the project:

12. Conflict with approved plans for the area or the Oakland Comprehensive Plan?
13. Carry the risk of an explosion or the release of hazardous substances, including oil, pesticides, chemicals or radiation?
14. Require relocation of residents and/or businesses?
15. Cause a substantial alteration in neighborhood land use, density or character?
16. Generate substantially increased vehicular movement or burden existing streets or parking facilities?
17. Elicit substantial public controversy or opposition?
18. Have a substantial impact on existing transportation systems or circulation patterns?
19. Result in a substantial increase of the ambient noise levels for adjoining areas?
20. Impose a burden on public services or facilities including fire, solid waste disposal, police, schools or parks?
21. Impose a burden on existing utilities including electricity, gas, water, and sewers?
22. Destroy, deface or alter a structure, object, natural feature or site of historic, architectural, archeological or aesthetic significance?
23. Involve an increase of 100 or more feet in the height of any structure over any previously existing adjacent structure?

Yes Maybe No Source or Explanation

 X See attachment

X " "

X " "

X " "

 X

 X See attachment

X " "

 X

X See attachment

 X " "

 X " "

 X

 X

 X See attachment

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 X

<u>Energy:</u> Will the project:	<u>Yes</u>	<u>Maybe</u>	<u>No</u>	<u>Source or Explanation</u>
24. Use or encourage use of substantial quantities of fuel or energy?	_____	_____	<u>X</u>	_____

IV. MANDATORY FINDINGS OR SIGNIFICANCE (EIR required if answer to any of the following questions is "yes" or "maybe".)

	<u>Yes</u>	<u>Maybe</u>	<u>No</u>
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	_____	<u>X</u>	_____
b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	_____	_____	<u>X</u>
c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	_____	<u>X</u>	_____
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	_____	<u>X</u>	_____

If any "yes" or "maybe" answers are marked, describe the specific nature of the environmental effects involved and their relationship to the project. (Use an attached sheet if necessary.) SEE ATTACHMENT

V. DETERMINATION:

On the basis of this initial evaluation:

- ☐ I find the proposed project WILL NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.
- ☒ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Name Charles S. Bryant

Date October 11, 1988

Title Assistant Planner

ATTACHMENT TO INITIAL STUDY

III. ENVIRONMENTAL EFFECTS

1. The vicinity of the site has a history of landslides and unstable soils. Major landslides occurred on and around the site in the winters of 1981-82 and 1982-83, in which part of Redwood Road below the adjacent Oakland Hills Tennis Club was blocked and several tennis courts were damaged. There have also been several other slides in the general area of the site in recent years. Excavation and earth disturbance for building construction may have contributed to the landslide problem of the area in the past. The proposed development would be located on a steeply sloping site. It will require excavation and grading which might contribute to future landslide problems.

According to the Geotechnical Investigation prepared for the project by Alan Kropp & Associates in August 1988, "the primary considerations for geotechnical design at the site include potential hazards related to the soft serpentine bedrock exposed on portions of the eastern half of the property, soil and fill creep in the swale in the northern corner of the site, and surficial erosion of exposed soils and bedrock." This report recommends that a detailed erosion control and revegetation plan be prepared for the site. It also contains a number of more specific recommendations for reducing the risk of future landslides.

2. According to the Geotechnical Investigation, grading for the upper road and garages for upslope homes will require retaining walls up to 12 feet high. Retaining walls will also be required for the lower driveway and parking areas, and grading will be required for the building pads. An existing erosion gully is also to be filled. This grading will result in major changes to the topography of the site.
3. According to the Geotechnical Investigation, portions of the site are overlain by loose fill, and most of the upslope homesites are on sheared serpentine bedrock, which has poor slope stability characteristics.
4. According to the Geotechnical Investigation, a branching fault trace, not related to the Hayward fault, has been mapped across the site (Radbruch, 1969). The Hayward Fault runs generally along the Warren Freeway (Route 13), which is about a half mile from the site.
7. Grading on the site during construction, and runoff from the paved lower driveway, upper road, and parking areas, may adversely affect downstream water quality.
8. The construction site is sloping, and the proposed development, including grading, filling, and the addition of extensive paved areas, will result in changed drainage patterns, which in turn could contribute to erosion and landslide problems (see numbers 1, 2, and 3 above). The Geotechnical Investigation recommends preparation of a revegetation plan for erosion control purposes by a licensed Landscape Architect familiar with serpentine bedrock. This Landscape Architect should also be familiar with the potential habitat requirements of the Clarkia franciscana plant (see number 11 below).
9. No groundwater was encountered when the Geotechnical Investigation was prepared, which included eleven exploratory test pits and eight exploratory borings up to 48 feet deep.

10. There are a grove of oak trees and two large eucalyptus trees on the southwestern portion of the site, near the corner of Redwood Road and Crestmont Drive, in the area where the townhouses are proposed to be constructed. There is also a group of pines on the southeastern portion of the site, near the intersection of the proposed upper road and Redwood Road, and a group of various trees, including an 18-inch oak tree, at the western end of the proposed upper road. While the project will incorporate many of the existing trees, some of them are proposed to be removed. Many of the trees to be removed are large enough to require a Tree Removal Permit from the City. Project plans include an inventory of oak trees on the site, but not the pines and other trees. These should all be identified, and it should be indicated which will remain and which will be removed. In addition, it is questionable whether some of the oaks can actually be retained without major pruning or project redesign because of their proximity to proposed parking areas (see number 16 and 18 below).
11. The geology of the site is dominated by soils rising from "serpentine bedrock", which is prime habitat for the Clarkia franciscana ("Presidio Clarkia"). This plant is listed as "endangered" by the State, and is on Federal candidate "List No. 1", which means that the U.S. Fish and Wildlife Service has information on file which would support its listing as an endangered species by the Federal government. The Clarkia franciscana was discovered in May 1988 on the adjacent site of the Oakland Hills Tennis Club. At that time, the environmental consultant for the tennis club expansion project also investigated the site of the proposed Oakcrest development, and found no evidence of the plant. However, the plant is only identifiable for a short time in May or June when it is in bloom, its flowers are very small, and 1988 is considered a dry year. Consequently, the plant may still exist on the site, even though it was not found upon field investigation. This is of particular concern because the project sponsor has indicated that most of the excavation for the project would be in serpentine rock, which will be used as fill elsewhere on the site. It is suggested that an additional field survey be undertaken in May or June of 1989, and that if evidence of the plant is found at that time, appropriate mitigation measures be developed in consultation with the State Department of Fish and Game.
12. The proposed development would include 32 dwelling units on a site of about four acres, or an average of about 5400 square feet of land per unit. The Oakland Comprehensive Plan designation of the site is "Low-Density Residential", with 5,000 to 9,999 square feet of land per unit. The site is zoned R-30 One-Family Residential, which requires a minimum site area of 5,000 square feet per unit. The project is therefore consistent with both the land use designation of the Oakland Comprehensive Plan and the density requirements of the Zoning Regulations.
15. The site and adjacent hillside areas are presently open land, dominated by rock outcroppings and a few groves of trees (see 10 above). The proposed development is similar in character to other residential development in the area southwest of Crestmont Drive, but would alter the open hillside character of the site. It would be visible from distant vantage points below the hills, from key vantage points along Redwood Road and Crestmont Drive, and from adjacent properties. A visual analysis of the project should be conducted, including trees to be removed and those to remain.
- 16 and 18. The proposed development is not expected to have a significant impact on traffic, but might have an impact on parking and local circulation.

Traffic. According to the Trip Generation manual, 4th edition, September 1987, published by the Institute of Traffic Engineers, the trip generation rate for residential planned unit developments is 7.439 trips per day per dwelling unit. For the proposed 32-unit PUD, this would equal 238 trips per day. Seventeen units, generating 126 trips per day, would be accessed from Crestmont Drive, and fifteen units, generating 112 trips per day, would be accessed via Redwood Road. The most recent traffic counts taken by the City's Traffic Engineering Division indicate that Redwood Road carries about 15,000 vehicles per day below Campus Drive, about 8,000 vehicles per day between Campus and Crestmont Drives, and about 5,000 vehicles per day above Crestmont Drive. Crestmont Drive carries about 2,000 vehicles per day. The 238 trips per day generated by the proposed project would not be expected to have a significant effect on traffic congestion on these streets, although the level of service of key intersections in the area should be quantified.

Parking. The Zoning Regulations for the R-30 Zone require two parking spaces per unit for one-family dwellings, and 1.5 parking spaces per unit for multi-family dwellings. The project sponsor has indicated that parking in this required ratio will be provided.

However, the requirements of the Zoning Regulations are not necessarily a reflection of the true demand for parking. Studies undertaken by the City Planning Department have shown that residential parking demand citywide is about one resident parking space per three habitable rooms, and 0.2 visitor parking spaces per unit. Project plans indicate that the townhouse units will have 6 rooms each, upslope single-family homes will have 7 rooms each, and downslope single-family homes will have 8 rooms each.

In the upper road area, there will be a total of 15 single-family homes, of which 7 will be upslope and 8 will be downslope. The total parking demand in this area will therefore be 41 spaces, calculated as follows:

Resident parking:

7 upslope homes x 7 rooms/home = 49 rooms

8 downslope homes x 8 rooms/home = 64 rooms

Total Rooms = 113 rooms

Divided by 3 rooms/space

Resident parking demand = 37.67 spaces

Rounded to 38 spaces

Visitor parking:

Total number of dwelling units = 15 units

x 0.2 spaces per unit

Visitor parking demand = 3 spaces

TOTAL PARKING DEMAND (Resident + Visitor) = 41 SPACES

This is an average of about three parking spaces per house. The project sponsor has indicated that each house would have a two-car garage, plus space for two more cars to park in the driveway, and that no parking on the street would be allowed. The total amount of off-street parking in the upper road area would therefore be 60 spaces (15 homes x 4 spaces each). It therefore appears that there will be no parking problems in the upper road area.

In the lower area, there will be 16 townhouses and one single-family home. The total parking demand in this area would therefore be 38 spaces, calculated as follows:

Resident parking:

16 townhouses x 6 rooms/unit	= 96 rooms
1 downslope home x 8 rooms/home	= <u>8</u> rooms
Total Rooms	= 104 rooms
Divided by	3 rooms/space
Resident parking demand	= 34.67 spaces
Rounded to	35 spaces

Visitor parking:

Total number of dwelling units	= 17 units
	x 0.2 spaces per unit
Visitor parking demand	= 3.4 spaces
Rounded to	3 spaces

TOTAL PARKING DEMAND (Resident + Visitor) = 38 SPACES

A total of 26 garage parking spaces will be provided in the lower area, as follows:

4 groups of 3 townhouses x 5 parking spaces	= 20 spaces
2 groups of 2 townhouses x 2 parking spaces	= 4 spaces
1 single-family home x 2 parking spaces	= <u>2</u> spaces
TOTAL	26 spaces

In addition, an open parking bay is shown in the lower driveway area which appears to provide 2 or 3 spaces, making the total parking supply in this area 28 or 29 spaces. This is 9 or 10 spaces short of the calculated demand of 38 spaces, and it does not appear that there would be sufficient room for additional parking in the driveway and maneuvering areas. It would therefore be expected that 9 to 10 cars would have to park on the street along Crestmont Drive.

An additional concern is the existing oak trees in the vicinity of the townhouse garages, particularly those around the units designated as T8 through T13 and S16, and the steep drive leading up to these units. Many of these trees have very low branches, and the trunks of some are located in very close proximity to the garages, making maneuvering difficult. This situation should be fully investigated, with an eye towards redesigning the project if necessary to preserve as many trees as possible.

Circulation. The upper road will extend off of Redwood Road, opposite the existing intersection with Old Redwood Road. This is at end of a straight downhill section which has fairly good sight distance, but where traffic tends to travel quite fast. Also, because of the existing median which is proposed to remain, the upper road will only have right turn access onto and off of Redwood Road. Therefore, those driving to this road from below will have to travel about a quarter mile up Redwood Road to the next opening in the median (at the entrance to the Oakland Hills Tennis Club), make a U-turn, and come back. Those heading up Redwood Road from this upper road would have to travel about 400 feet down to Crestmont Drive and make a U-turn. These circumstances should be further investigated for any potential impacts on local circulation.

The lower driveway area will have full access off of Crestmont Drive, opposite Samaria Lane about 300 feet from Redwood Road. Samaria Lane is a private street which serves a similar townhouse development. This intersection should be studied for any potential impacts on local circulation, although it does not appear that there will be any major problems. Internal circulation in the lower driveway area may be problematic, however, given the steep grades, small radius turnaround area, oaks trees, and anticipated parking shortfall. This should be studied further.

17. Other projects in this area have been controversial, and it is possible that this one will be also.
19. Noise associated with construction may be annoying to nearby residents.
20. While fire and police services are probably adequate to serve the proposed project, these departments may have concerns about access. The lower driveway area would be difficult for firetrucks to negotiate. The proposed upper road would be about 500 feet long with a circular end 50 feet in diameter, which might also pose problems for firetrucks. (The Oakland Subdivision Regulations specify that "blind streets" shall not be more than 300 feet long with a circular end at least 80 feet in diameter.) The Police Department is known to be concerned about quick, positive identification of individual units within a project, to expedite emergency response.

The capacities of local schools, parks, and solid waste disposal should also be investigated to determine whether the project will adversely affect these services.

21. The adequacy of local electricity, gas, water, and sewer service should be investigated to determine whether the project will adversely affect these utilities.

IV. MANDATORY FINDINGS OF SIGNIFICANCE

- a. The site contains potential habitat for the Clarkia franciscana plant, some of which will be graded for the project. The project therefore may have the potential to restrict the range of this endangered plant.
- c. The potential impacts discussed above may be individually limited, but cumulatively significant.
- d. The potential impacts discussed above may have substantial direct or indirect adverse effects on human beings.



CITY HALL • ONE CITY HALL PLAZA • OAKLAND, CALIFORNIA 94612

Planning Department

TTY 839-6451

December 5, 1988

NOTICE OF PREPARATION
OF A DRAFT ENVIRONMENTAL IMPACT REPORT
OAKCREST RESIDENTIAL PLANNED UNIT DEVELOPMENT

The City of Oakland, as the Lead Agency, will prepare an Environmental Impact Report (EIR) for the project identified below. We need to know your views as to the scope and content of the environmental information which is germane to your areas of interest or statutory responsibilities in connection with the proposed project. If yours is a regulatory agency, you may need to use the EIR prepared by us when considering your permit or other approval for the project. The project description, location, and probable environmental effects are described below. The map on the reverse shows the location. The Initial Study is available for inspection at the above address.

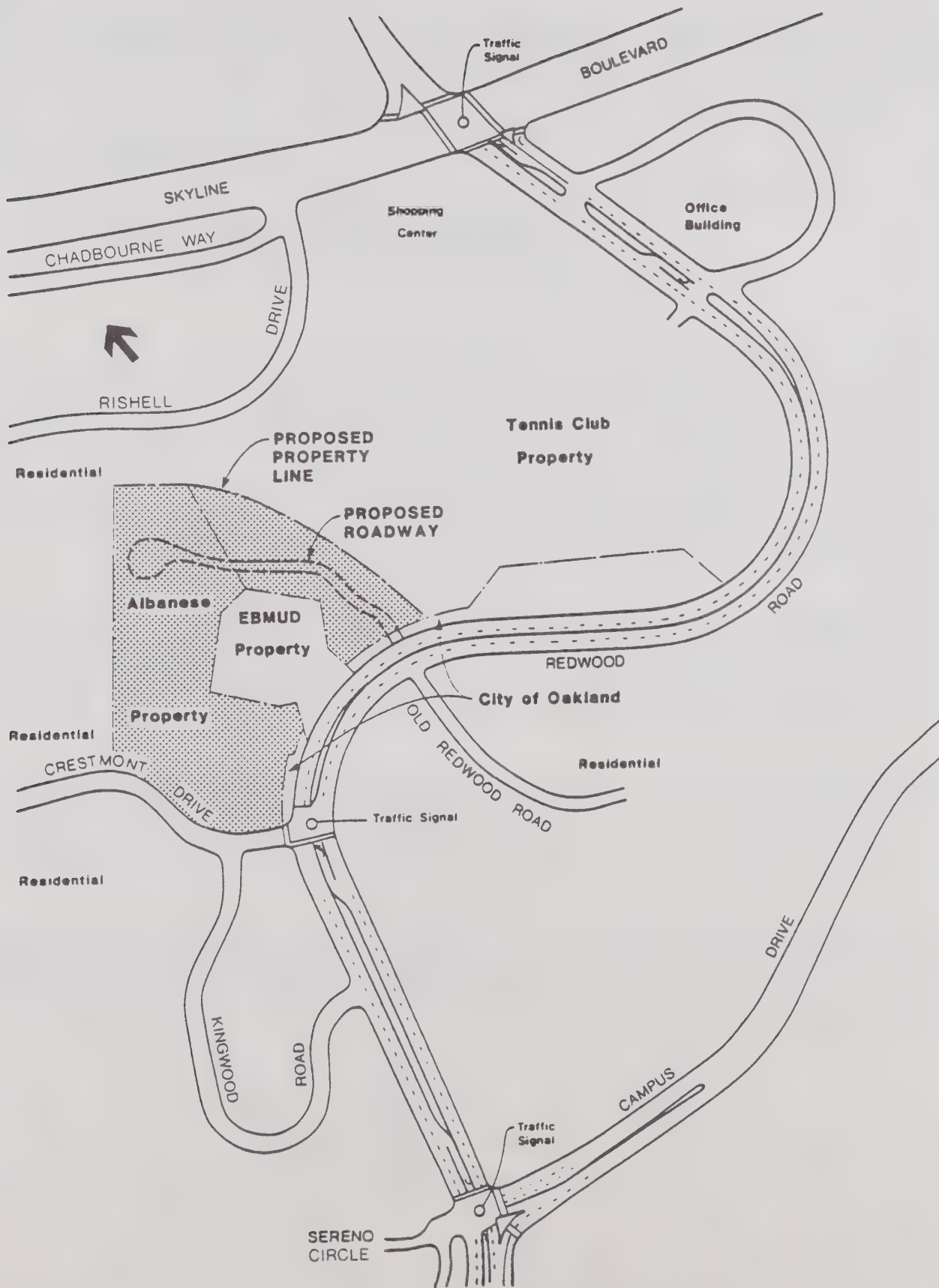
Project Description and Location: "Oakcrest Residential Planned Unit Development", a 32 unit residential development, including 16 single family units and 16 cluster townhouse units on a four acre site near the intersection of Redwood Road and Crestmont Drive. Project includes a new dead-end street about 500 feet long off of Redwood Road, and a driveway about 250 feet long off of Crestmont Drive.

Environmental Effects: The following areas of possible environmental effects have been identified: (1) soils and geology; (2) water quality and drainage; (3) vegetation and wildlife, including tree removal and possible endangered plant habitat; (4) visual quality; (5) traffic, parking, and circulation; (6) construction noise; and (7) public services and utilities.

Please respond to this Notice of Preparation as soon as possible, but no later than 30 days after you receive this notice. Please send your response and direct any questions or comments to Charles S. Bryant, at the above address, telephone (415) 273-3941. We will also need the name of a contact person in your organization.

A handwritten signature in dark ink, appearing to read "Alvin D. James".

ALVIN D. JAMES
Director of City Planning



CITY OF OAKLAND

Interoffice Letter

To: City Planning Attention: Charles S. Bryant Date: April 26, 1989

From: Office of Parks and Recreation

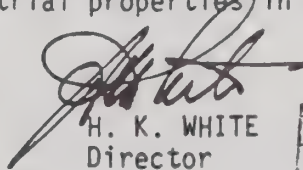
Subject: Oakcrest Planned Unit Development

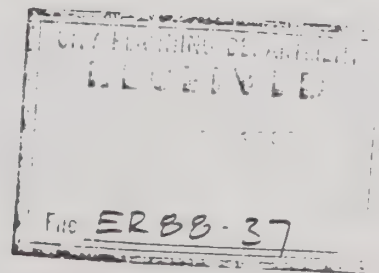
Thank you for the opportunity to review the preliminary draft EIR report for the proposed planned unit development.

The preliminary impact as you suggested is the impact on existing trees at the site north of Redwood Road. The vegetation impacts listed on the draft were inadequate and superficial. Please include the impacts described by James P. Ryugo, Arboricultural Inspector, in the attached April 17, 1989 memo.

With only 32 homes at approximately 3.5 persons per dwelling unit, this office understands why the report indicates there are not significant impacts on the urban open space and recreational facilities. Do note that youngsters in the new planned unit development, if it is constructed, should have careful supervision in crossing Redwood Road to use the Pinto Park area. Also, parents should be aware that the Jones Ballfield and the playing area will naturally have the noise of active play in the evenings as well as daytime. Also, if a new portable will be installed at the Carl B. Munck playground, the play area and Jones Ballfield area can be expected to be more heavily used than it has been until now.

The Office of Parks and Recreation would also like to see the City Planning Department develop an ordinance for Council to insure some Park and Recreation fee on such developments in the future. Even if the City of Oakland has not adopted the Quinby Act to levee a Park and Recreation use impact fee on new developments in Oakland, it is time that such a fee be established. In that way the burden of developing and maintaining the City's parks and recreation facilities will be adequately shared by new developers and new investors and owners of residential, commercial and industrial properties in Oakland.


H. K. WHITE
Director



Attachment

AF:bw

cc: Dennis Flannery
C. W. Weatherton
Aileen Frankel

CITY OF OAKLAND
Interoffice Letter

RECEIVED APR 17 1989

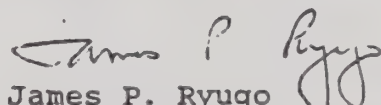
To: Office of Parks and Recreation Attention: Aileen Frankel Date: April 17, 1989

From: Tree Section

Subject: Oakcrest Draft EIR

The project site has many significant live oak trees with trunk diameters up to 24" and these trees are considered valuable and irreplaceable. Given the size of these trees (see Figure 4.6-2) it is estimated the grove of oak trees is 75-100 years old. The Draft EIR fails to adequately preserve or protect the grove of oak trees and the following comments should be incorporated into OPR's response.

1. Site Plan (figure 3-4) was reduced to fit as an overlay on the Aerial Photograph (figure 3-3) and it appears the grove of oak trees on the southwest corner would be severely damaged, if not eliminated by the construction of units T8-T16 and S16.
2. Construction of units T8-T16 and S16 will require grading (cut and fill) activity around the oak trees. This grading will either damage the root system by cutting or severing the roots in the cut areas or suffocating the root systems in the fill areas. Both activities will result in physiological decline and tree death in a few years. Oak trees are sensitive to soil compaction, changes in grade and altered water run-off pattern and it appears that more than 7 or 8 oak trees will be removed or significantly damaged by construction activities.
3. On page 4-25, the document is partially incorrect by stating eucalyptus, pine and acacia trees are not protected by the Tree Preservation Ordinance. All eucalyptus trees are exempt from the Ordinance but pine and acacia trees measuring greater than nine (9) inches in diameter or greater are protected trees. The developer would be required to obtain a tree removal permit for all protected trees.
4. The grove of oak trees could be saved by reducing the number of clustered units being proposed. Alternatively, four (4) single family units could be substituted for the clustered units within the oak grove and there would be sufficient room to preserve the oak trees as part of the landscaping. The clustered units could be built on the upper access road and there would not be a net loss in the number of units.


James P. Ryugo
Arboricultural Inspector

4/17/89 Jerry Fensford - Calverton P.D.

Water supply - requirements for fire hydrants
and/or flow requirements.

Sprinklers not now req'd.

Wants 50' turning diameter.

20' roadway widths. - clear up flag.
(undisturbed).

would be concerned about grades.

30% may be too steep.

Concern about taking hoses into the deep.

Need hydrant along upper drive due to length.

Most remote part of deep need to be
within 500 feet of fire hydrant w/adequate
flow (SFDD).

300 feet for SFDD.

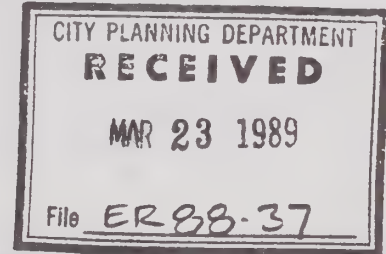
CITY OF OAKLAND

Interoffice Letter

To: Engineering/
Code Compliance Attention: Joseph Wong Date: March 13, 1989

From: Engineering and Design Services

Subject: Draft EIR for the Oakcrest
Subdivision



We have reviewed the draft EIR for the subject project and the following are our comments:

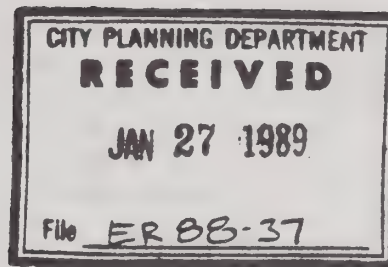
1. Due to known unstability of the soil adjacent the project site, a comprehensive geotechnical report acceptable to the City is required as part of the final design and the recommended mitigation measures by the consultant should be incorporated and are subject to the Office of Public Works review and approval.
2. The EIR does not include any handicap provisions. The final design should include handicap ramps at all curb returns in accordance with the State standards.
3. According to section 4.5.3 (page 4-40) of the EIR, Mitigation Measures, a five-foot sidewalk is recommended along portion of Crestmont Drive. Clarification should be made that a five-foot sidewalk is acceptable if a planter strip is used between the back of curb and the sidewalk. Otherwise, to avoid conflict of pedestrians with traffic lights, signals, signs, and for handicap facility requirements a six-foot sidewalk from the back of curb is required.
4. The final drainage and grading plans are subject to the Office of Public Works review and approval.
5. The EIR does not include any proposal for a sewage system for the development. The applicant should be required to submit plans for approval. Upon review of the draft EIR for the subject project, our preliminary study indicates that anticipated impacts from the proposed thirty two (32) dwelling units would be insignificant on City sewer collection systems. However, the sewage system needs to be addressed along with other items of this EIR.

A handwritten signature in dark ink, appearing to read "Vernon H. Sullivan".

VERNON H. SULLIVAN
Principal Civil Engineer

MH/VHS/sss

January 18, 1989



CHARLES R. BRYANT
City Hall
One City Hall Plaza
Oakland, CA 94612

RE: OAKCREST RESIDENTIAL PLANNED UNIT DEVELOPMENT

Mr. Bryant:

In the middle of December, I received the notice that a new development was in its initial planning stages and the city was interested in comments concerning that development.

I didn't understand whether I had to be an organization to comment, or if I could comment as a homeowner whose life could be affected by the planned unit.

In any event, I would like to now tell you my concerns about this proposed project.

We live at 329 Rishell Drive, which is on the view side of Rishell Drive, just above where the new development is planned.

1. INTEGRITY OF THE HILL

Our next door neighbor, who died five years ago, was a soils engineer. He told me, almost daily, that if any cutting into the hill was done, the result could be disastrous and we stood the risk of losing our home due to sliding. This was due to the slippery nature of serpentine, which is the main composition of the hill. We are terrified that cutting into the hill at a lower level will create this chain reaction and our yard and house might be in jeopardy. I am not a soils engineer and I understand that this sort of statement I just made has no scientific basis other than the opinion of a soils engineer who is no longer with us.

Fortunately we have lots of trees on our property which helps to hold the hill together. Still, we have noticed a minor amount of slippage over the years, just behind our backyard.

2. SOILS REPORT

I find it upsetting that the same person who did the soils report on The Oakland Hills Tennis Club is doing the report for this new development. The Oakland Hills Tennis Club is just to the left of us, and so the terrain is similar. That would mean that if the Tennis Club's plans went through

(which they have) then the plans for the new development are an automatic to go through, since there is a pre-bias by the person doing the report, given his conclusions on the Tennis Club's report. Somehow, that just doesn't seem ethical from the city's standpoint, while being quite smart on the part of the new developer. I hope the city has a way of verifying the report by having their own engineers validate the report through actual testing.

3. NOISE

Sounds tend to carry up the hill dramatically. In fact, we hear softball games from Pinto Field as though they were in our backyard. Now we'll have neighbors in our backyard, which I'm sure will sound like they're in our house. That means we'll have the sounds of building for at least a year or two, followed by the sounds of neighbors carrying up the hill into the house. When we bought our house, we bought it because of the view and the quiet. It looks like we lose some part of both of those commodities.

4. VIEW

With new homes immediately below us, the lights from those homes will destroy our view, which has been among the best views in Oakland. We have done all we can to maximize our view, to the extent of building a new dining room in 1980 with large view windows to maximize the view. It's very upsetting to have that view compromised. In terms of home value, it has to lower the value of the house to have a compromised view.

5. VISUAL QUALITY

Not much to comment here. There is a horrid eyesore of a project to our lower right, below Crestmont Drive. They are a group of beige townhouses which are very badly done. Meanwhile, next to that project, just below us, on the lower side around Kingwood Road, are individual homes which seem to fit into the landscape because of their darker coloration and the way they're positioned in their environment.

6. In terms of wildlife, it looks like we'll see the end of the deer who habitate this back hill, as well as the occasional foxes, raccoons, opossum and such. We'll be sorry to see that happen.

I'm sure this letter sounds like a homeowner who hates the thought of any progress that interferes with his personal pleasures, and so dredges up whatever negatives he can to stem that progress. Not so. I understand the need for new homes and certainly realize that my children won't have a chance at a new home in their lives if there isn't new home expansion to meet

that need. But I do, for the reasons stated, feel that the Oakcrest Residential Planned Unit Development is a bad idea.

I will file this letter with my attorney as well, to make sure it's on the record in case problems arise in the future which can only be solved through legal channels.

I appreciate the letter you've sent me and assume you will give careful consideration to my concerns.

Thank you.

Respectfully yours,

A handwritten signature in dark ink, appearing to read 'Arthur R. Twain', with a stylized, cursive script.

Arthur R. Twain
329 Rishell Drive
Oakland, CA 946419
415 531-2267

CITY OF OAKLAND



CITY HALL • ONE CITY HALL PLAZA • OAKLAND, CALIFORNIA 94612

Planning Department

TTY 839-6451

January 9, 1989

Dr. Ruben Peterson
48 Kingwood Road
Oakland, CA 94619

Dear Dr. Peterson:

This is to acknowledge our telephone conversation this morning concerning the Notice of Preparation of a Draft Environmental Impact Report (EIR) for the proposed 32-unit Oakcrest Residential Planned Unit Development.

You expressed concern about several issues, including removal of some of the oak trees in the grove near the Crestmont Drive/Redwood Road intersection, deer migration patterns in the canyon just north of the site, and police services related to noise problems from high school students gathering at night in the nearby Pinto Recreation Area and at other locations. Your concern about these issues will be forwarded to the EIR consultant for consideration in the EIR.

For your information, I am enclosing a copy of our Initial Study on the project. You will also be included on the mailing list for the EIR when it is published. If you have any further questions, please feel free to call me at 273-3941.

Sincerely,

A handwritten signature in dark ink, reading "Charles S. Bryant". The signature is fluid and cursive, with a long horizontal stroke extending from the end of the name.

CHARLES S. BRYANT
Environmental Review Coordinator

CSB:crr

Enclosure

cc: EIP Associates, EIR Consultant

ER88-37

F-180 35ER8837.CSB

CITY OF OAKLAND



CITY HALL • ONE CITY HALL PLAZA • OAKLAND, CALIFORNIA 94612

Planning Department

TTY 839-6451

January 9, 1989

Ms. Diane R. Judd, Secretary
Landscape and Architecture Committee
Redwood Hills II Homeowners Association
245 Samaria Lane
Oakland, CA 94619-2351

Dear Ms. Judd:

I have received your letter of December 30, 1988 concerning our Notice of Preparation of a Draft Environmental Impact Report (EIR) for the proposed 32-unit Oakcrest Residential Planned Unit Development.

The purpose of the Notice of Preparation is to advise interested parties and adjacent property owners of the project, to ensure that all relevant issues are considered in the EIR. You have raised a number of issues, including the following: traffic impacts on Redwood Road and Crestmont Drive; local circulation impacts ~~at the Crestmont/Redwood and Crestmont/Samaria Lane intersections~~; pedestrian circulation along Crestmont Drive; and removal of some of the oak trees in the ~~grove~~ near the Crestmont/Redwood intersection. Please be assured that these issues will be considered in the EIR.

Incidentally, the door-to-door traffic survey to which you refer is being conducted for us as part of the traffic analysis section of the EIR. Its results will be included in the EIR.

For your information, we are enclosing a copy of our Initial Study for the project, which discusses these issues. You will also be included on the mailing list for the EIR when it is published. If you have any further questions, please contact Charles S. Bryant, Environmental Review Coordinator, at the above address or telephone 273-3941.

Sincerely,

A handwritten signature in dark ink, appearing to read "Alvin D. James".

ALVIN D. JAMES
Director of City Planning

Enclosure

cc: Mr. Lynn Beckwith, President
Redwood Hills II Homeowners Association

Mr. Donald Rogers, Chairman,
Landscape and Architecture Committee
Redwood Hills II Homeowners Association

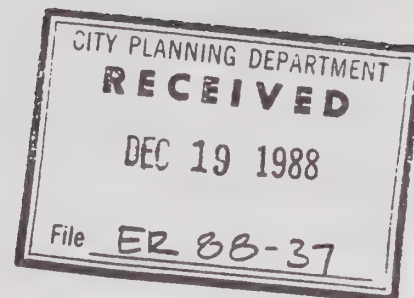
EIP Associates, EIR Consultants
Thomson Engineers, Traffic Consultants

ER88-37

F-180 34ER8837.CSB

Pacific Gas and Electric Company

1919 Webster Street
Oakland, CA 94612
415/835-8500



December 15, 1988

Mr. Alvin D. James
City of Oakland
One City Hall Plaza
Oakland, CA 94612

Re: Notice of Preparation of a Draft E.I.R.
Oakcrest Residential Planned Unit Development
PG&E File No. 88-12-378

Dear Mr. James:

We have reviewed the Oakcrest Residential Planned Unit property located at the intersection of Redwood Road and Crestmont Drive and do not object to the proposed development.

It appears we do not have any facilities other than normal service facilities in that area.

If we may be of further assistance regarding this matter, please call Mr. Mike Gigliotti at 874-2326.

Sincerely,

A handwritten signature in cursive script, appearing to read "John H. Hink".

John H. Hink
Land Records Supervisor
Regional General Services

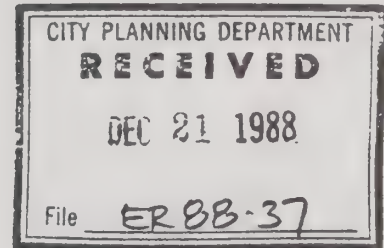
CITY OF OAKLAND

Interoffice Letter

To: Planning Department Attention: Mr. Charles S. Bryant Date: December 21, 1988

From: Police Department
Officer C. Wengeler - CSD

Subject: Oakcrest Residential Development

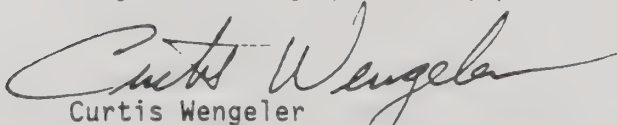


I have reviewed the Notice of Preparation of a Draft EIR for the Oakcrest Residential Development.

I recommend the following security features which could reduce the impact of this development on police services.

- All residences should display a clearly visible address, no less than 6" in height.
- All exterior doors, and doors leading to the interior from the garage should be 1-3/4" thick solid core in construction.
- All exterior doors should be equipped with the following:
 - 1" deadbolt locks, twin cylinder with key retaining feature.
 - 190 optical viewer, front door only.
 - Maximum security strike plates on all deadbolt locks.
 - Non-removable hinge pins on all exterior doors.

If you have any questions, please call me at extension 3066.

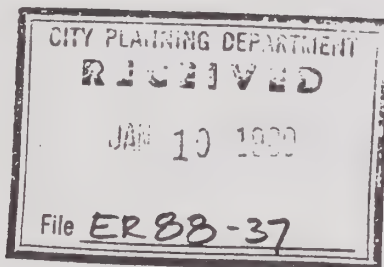

Curtis Wengeler
Commercial Security Officer
Community Services Division

DEPARTMENT OF TRANSPORTATION

BOX 7310
SAN FRANCISCO, CA 94120
(415) 923-4444



January 5, 1989



ALA-013-PM-5.39
SCH# 88121303
ALA013020

Charles S. Bryant
City of Oakland
#1 City Hall Plaza
Oakland, CA 94612

RE: OAKCREST RESIDENTIAL PLANNED UNIT DEVELOPMENT - NOTICE OF PREPARATION

Dear Mr. Bryant:

Thank you for including the Department of Transportation (Caltrans) in the environmental review process for the above-referenced Notice of Preparation. The environmental document for the proposed 32 unit residential development should address the traffic impact in terms of:

- a) Trip generation, distribution and assignment;
- b) ADT, and AM and PM peak hour volumes for State Route 013, and for all significantly affected streets and highways, including freeway ramps and crossroads, and controlling intersections for existing and future traffic.
- c) Future conditions with project traffic and with cumulative traffic generated by all approved, proposed, and potential developments in the area. Coverage should include all traffic that would affect the facilities evaluated, and should not be limited to projects under the jurisdiction of the lead agency.
- d) Mitigations that consider highway and non-highway improvements and services. Special attention should be given to the development of alternative solutions to circulation problems which do not rely on increased highway construction. For example, include methods of Traffic Demand Management, coordination of employment and housing strategies, Public Transit Development, Traffic Reduction Strategies like ridesharing, vanpooling, carpooling and park and ride.

ALA013020
Page Two
January 5, 1989

- e) All mitigations being proposed should be fully discussed in the environmental document. Those discussions should include, but not be limited to, the following areas:

financing,
scheduling considerations,
implementation responsibilities,
monitoring responsibilities.

We appreciate the opportunity to work with you on this project and look forward to reviewing the draft E.I.R. when it becomes available. We expect to receive a copy from the State Clearinghouse; however, to expedite the review process, you may send two (2) advance copies to the undersigned contact person for this agency at the following address:

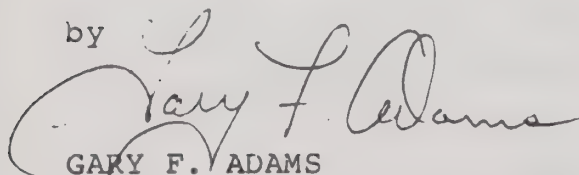
GARY F. ADAMS
District CEQA Coordinator
Caltrans District 4
P.O. Box 7310
San Francisco, CA 94120

Should you have any questions regarding these comments, please contact Alice Jackson of my staff at (415) 557-9066.

Sincerely yours,

BURCH C. BACHTOLD
District Director

by

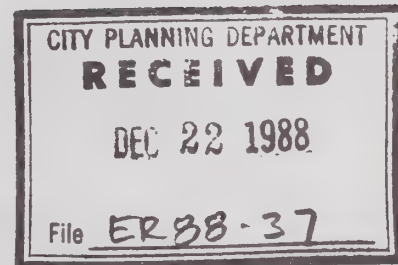


GARY F. ADAMS
District CEQA Coordinator

cc: Loreen McMahon, State Clearinghouse
Susan Pultz, MTC
Sally Germain, ABAG

12-21-88

MR. CHARLES S. BRYANT
PLANNING DEPARTMENT
CITY HALL
ONE CITY HALL PLAZA
OAKLAND, CA 94612



DEAR MR. BRYANT:

I RECEIVED A NOTICE OF PREPARATION OF
A DRAFT EIR FOR OAKCREST RESIDENTIAL
PLANNED UNIT DEVELOPMENT. I DON'T
KNOW WHAT IS PLANNED BUT I DO WANT
TO SAY THAT THE STAND OF OAK TREES
SHOULD BE PRESERVED. IN SPRING AND
FALL THEY PROVIDE SHELTER TO AT
LEAST FIVE SPECIES OF MIGRATORY
BIRDS. THE TREES ARE BEAUTIFUL.
IS THERE ANY WAY THAT SMALL PARCEL
COULD BE DESIGNATED AS OPEN SPACE?

SINCERELY,
Daniel J. Fitzgerald

DANIEL J. FITZGERALD
227 SAMARIA LANE
OAKLAND, CA 94619

December 20, 1988

Mr. Charles S. Bryant
90 Planning Department
City Hall - 1 City Hall Plaza
Oakland, Ca. 94612

Re: Oakcrest Residential
Planned Development

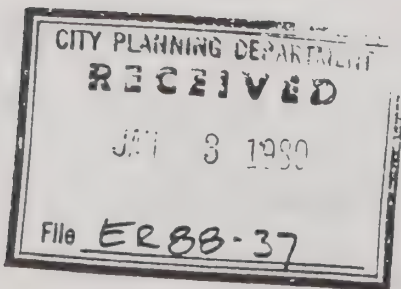
Dear Mr. Bryant:

Ans. Letter December 12, 1988

I am a resident of Crestmont Home Development. Answering a letter from Alvin D. James, Director of City Planning regarding above project.

When I moved to Crestmont thirty years ago the area was zoned "Residential. Since then the following have been built along Redwood Road (which is a one mile stretch of steep, winding down hill grade) or feed into Redwood Road.

- 2 shopping centers
- Crestmont Homes (about 300)
- Ridgemont Homes
- 2 condominium developments
- 3 churches
- Hills Swim and Tennis Club
- Recreation Dept Ball Park
- Office Buildings
- Merritt College
- Skyline High School
- Carl Monk Elementary School
- 2 Gasoline Stations



The latest condominium development, which abuts my property, is an eye-sore and looks like low-income housing.

Thousands of cars and school buses use Redwood Road daily. On weekends, cars are parked along both sides of Redwood Road by people using the Recreation Dept. Ball Park.

Children from Crestmont Homes cross Redwood Road to Carl Monk School.

Many Skyline High School students disregard speed limits and stop signals on Redwood Road.

My home was involved in the tragic land slide at Crestmont thirty years ago. I know what another winter such as that would do to the soil in this area.

This area is vastly overbuilt, and more construction would greatly affect the soil, water and drainage, vegetation, visual quality, traffic, construction noise. Another outlet on Redwood and Crestmont would be very dangerous.

I think the Planning Department should visit this area before making any decisions on this project.

Please consider the above objections to further construction.

The President of Crestmont Homes Assn is Mary Warren
95 Kimberlin Hgts Dr.
Oakland, Ca. 94619
531-5069

Thank you.

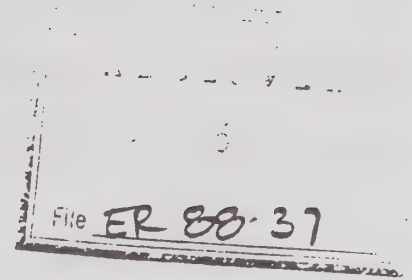
Mrs. Helen Butzing
575- Crestmont Dr.
Oakland, Ca. 94619
531-0859

Copy to:
Mr. Dick Speer

245 Samaria Lane
Oakland, California 94619-2351

December 30, 1988

Mr. Alvin D. James
Director of City Planning
City of Oakland
One City Hall Plaza
Oakland, California 94612



Re: Draft Environmental Impact Report
Oakcrest Residential Planned Unit Development
File PUD 88-367

Dear Mr. James:

In response to your Notice of Preparation of a Draft Environmental Impact Report -- Oakcrest Residential Planned Unit Development dated December 5, 1988, I must call to your attention to the fact that neither the map on the reverse side of your correspondence nor Map 151 B 476 (193) on file in the Planning Commission office indicates the existence of Samaria Lane and Teralynn Court and the 47 single-family attached units of the Redwood Hills II development. I would fear that adequate consideration may not be given our existence and the impact on traffic, to mention only one concern.

You indicate in your notice that: "Project includes a new dead-end street about 500 feet long off of Redwood Road, and a driveway about 250 feet long off of Crestmont Drive." The proposed roadway off Redwood Road is sketched in your map, but that off Crestmont Drive is not. Upon reviewing the file in Mr. Bryant's office, I see that the proposed "driveway" off Crestmont Drive would be directly across from lower Samaria Lane thereby creating an almost blind intersection at a critical point where Crestmont curves and rises abruptly (or drops coming from the west). I note that "16 single family units and 16 cluster townhouses" are planned, and, in fact, there would be 17 units clustered around the 250-foot "driveway" off Crestmont Drive and 15 on the roadway off Redwood Road. My neighbors have remarked recently about the increased traffic turning from Redwood Road onto Crestmont Drive, often at considerable speed. This includes not only additional residents on Kingwood Road making a sharp left a short half block from Redwood and our Samaria Lane residential traffic slowing to turn left on Samaria, but also heavier traffic speeding close behind to get a start on the abrupt rise in Crestmont Drive just where lower Samaria Lane intersects. The prospect of new Oakcrest vehicles turning right at this same juncture presents the frightening specter of serious traffic hazards. Further, what are the plans for pedestrians on the north side of Crestmont where there currently is no sidewalk?

In addition to the potential traffic problems presented by the "driveway" off Crestmont Drive, its hook shape angling into a lovely oak grove is quite disturbing. Of the 17 units proposed for this area, it would appear that ten are slated for construction in this oak grove. This is the prime area of natural beauty on the Albanese property, and my neighbor, Dan Fitzgerald, expresses the sentiments of most of the residents in his letter to you of December 21st encouraging the oak grove's preservation.

December 30, 1988

Mr. James, I feel it unfortunate that your notice of December 5, 1988 did not accurately reflect the specific plans of the proposed Oakcrest development regarding traffic patterns and unit location. Had the information been complete, more residents could have responded. The question of environmental effects that you raise in your third paragraph definitely need to be addressed seriously. A traffic consultant did a door-to-door survey three weeks ago, and the results of that should be made available to the public.

We do have a homeowners' group, Redwood Hills II Homeowners Association. In response to your request for a contact person, I offer two:

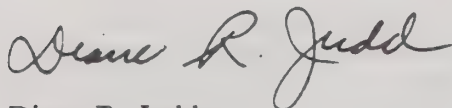
Mr. Lynn Beckwith
President
Redwood Hills II Homeowners Association
136 Samaria Lane
Oakland, California 94619-2351

Mr. Donald Rogers
Chairman, Landscape & Architecture Committee
Redwood Hills II Homeowners Association
63 Teralynn Court
Oakland, California 94619-2351.

The Board of Directors has referred response to the draft EIR to the Landscape and Architecture Committee which will discuss the issue at its January 10th meeting. The views I have expressed above are my own and are not meant to represent those of the Association or the individual homeowners. Furthermore, these comments give no consideration to the impact of potentially increased traffic problems on Redwood Road from the 500-foot road proposed close to the Oakland Hills Tennis Club property line. If you or Mr. Bryant could provide additional information to either Mr. Rogers or me before January 10th it would be greatly appreciated.

Thank you.

Sincerely,

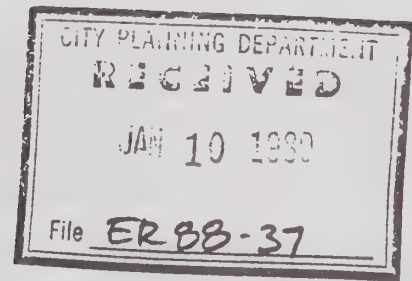


Diane R. Judd
Secretary
Landscape & Architecture Committee

cc: Charles S. Bryant
Redwood Hills II Homeowners Association

January 4, 1989

Charles S. Bryant
City of Oakland
Planning Department
One City Hall Plaza
Oakland, Calif. 94612



Dear Mr. Bryant,

This is in response to the Notice of Preparation of a Draft Environmental Impact Report/Oakcrest Residential Planned Unit Development dated December 5, 1988, but received December 7. While it is targeted to "organizations", it was in fact sent to individual residences. It is in this capacity that I submit my concerns.

I am a homeowner in the Crestmont community. My house is bordered by Rishell Drive and the hill directly overlooking the proposed development. Every item listed in your December 5 letter is a potential issue, and differentiated only in my perceived severity of each item.

For example, due to the design of the major boulevards in the area, we currently experience a noticeable amount of traffic which exceeds posted speed limits. An increase in population will increase this problem to some unknown degree.

Since my property includes part of the hill slope, the manner in which the construction is implemented concerns me. I would hope that the development firm understands any issues related to soil content since the area does experience heavy rainstorms. Improper tree removal would certainly endanger any house that backs up against this development.

The greatest concern I have is increased peril upon the natural wildlife in the area. There are large populations of deer, racoon, opossum, and birds of prey. The construction not only encroaches in their dwindling terrain, but the ultimate increase in traffic imperils them, as well as the domestic pet population.

I am available if you require additional input on my part. I can be reached during the day at 544-1719.
Sincerely,

Handwritten signature of Barbara Cerrudo in cursive script.

Barbara (Mrs. Carl E.) Cerrudo
297 Rishell Drive
Oakland, Calif. 94612

VICTOR J. VAN BOURG
GEORGE C. ALLEN (1924-1984)
STEWART WEINBERG
MICHAEL B. ROGER
DAVID A. ROSENFIELD
STANFORD L. GELBMAN
WILLIAM A. SOKOL
VINCENT A. HARRINGTON JR.
W. DANIEL BOONE
ROBERT M. HIRSCH
PAUL D. SUPTON
BLYTHE MICKELSON
BARRY E. HINKLE
JAMES RUTKOWSKI
SANDRA RAE BENSON
LORA JO FOO
JAMES G. VARGA
ANTONIO SALAZAR HOBSON
STEVEN W. SIEMERS
CHRISTIAN L. RAISNER

LAW OFFICES

VAN BOURG, WEINBERG, ROGER & ROSENFIELD

875 BATTERY STREET, SAN FRANCISCO, CALIFORNIA 94111

TELEPHONE (415) 864-4000

LOS ANGELES OFFICE
417 South Hill Street, Suite 770
Los Angeles, CA 90013
(213) 617-9374

OAKLAND OFFICE
450 Hegenberger Road
Oakland, CA 94621
(415) 562-2854
From San Francisco
(415) 864-4000

January 10, 1989

Charles S. Bryant
City of Oakland
City Hall
One City Hall Plaza
Oakland, CA 94612

RE: Oakcrest Residential Planned Unit Development

Dear Mr. Bryant:

The area to be developed is one of the last open areas in our neighborhood. The area below Samaria Lane is already being developed. The area along Kingwood is also being developed. There is abundant wild life in the area and their habitat is being destroyed.

Redwood road is already a very busy street, and additional traffic will cause a greater hazard for the children who attend Carl B. Mum school. It will also create noise and traffic problems.

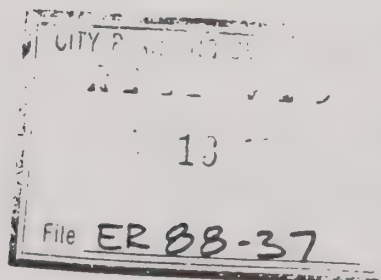
I hope that the City of Oakland realizes that it must leave open areas, which enhance neighborhoods and property values, before it begins to look like Los Angeles. If we leave nothing in its natural state, we will have smog to breathe, water shortages, and waste disposal problems. I hope that when you consider the environmental concerns you will also consider the unique area that exists; housing, parks and open areas, and not over use this area so that it looks just like every other part of Oakland.

Sincerely,

Timothy Van Bourg

TIMOHTY AND EVA VAN BOURG

OPE 3 (1)



OFFICE OF PLANNING AND RESEARCH

1400 TENTH STREET
SACRAMENTO, CA 95814

DATE: December 15, 1988

TO: Reviewing Agencies

RE: The City of Oakland's NOP for
Oakcrest Residential Planned Unit Development
SCH # 88121303

Attached for your comment is the City of Oakland's Notice of Preparation of a draft Environmental Impact Report (EIR) for Oakcrest Residential Planned Unit Development.

Responsible agencies must transmit their concerns and comments on the scope and content of the EIR, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of this notice. We encourage commenting agencies to respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Charles S. Bryant
City of Oakland
#1 City Hall Plaza
Oakland, CA 94612

with a copy to the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the review process, call Loreen McMahon or
at 916/445-0613. Marilyn Nishikawa

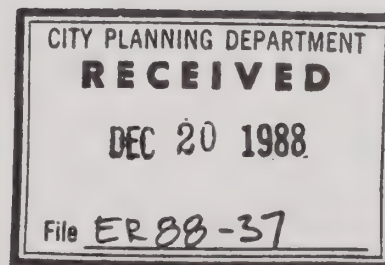
Sincerely,

A handwritten signature in dark ink, appearing to read 'David C. Nunenkamp'.

David C. Nunenkamp
Chief
Office of Permit Assistance

Attachments

cc: Charles S. Bryant



SCM:

88121303

S: Sent by land *X*: Sent by SCM

Sgt. Jim Weddell
California Highway Patrol
Long Range Planning Section
Planning and Analysis Division
2555 First Avenue
Sacramento, CA 95818
916/445-1981

William A. Johnson
Native American Heritage Comm.
915 Capitol Mall, Room 288
Sacramento, CA 95814
916/322-7791

Hans Kreutzberg
Office of Historic
Preservation
P.O. Box 942896
Sacramento, CA 94296-0001
916/322-9621

Mike Doyle
Dept. of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001
916/324-6421

George Herah
Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102
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APPENDIX B
GEOTECHNICAL INVESTIGATION

ALAN KROPP & ASSOCIATES GEOTECHNICAL CONSULTANTS

August 19, 1988
1025-1A, L 11296

Mr. Frank Albanese
6363 Redwood Road
Oakland, CA 94619

RE: Geotechnical Investigation
Oakcrest Homes
Oakland, California

Dear Mr. Albanese:

In accordance with your request, we have performed a geotechnical investigation for the proposed Oakcrest Homes subdivision to be constructed in Oakland, California. The accompanying report presents the results of our field investigation, laboratory tests, and engineering analyses. The soil and foundation conditions are discussed, and recommendations for the soil and foundation engineering aspects of the project are presented. The conclusions and recommendations contained herein are based upon applicable standards of our profession at the time this report has been prepared.

We refer you to the text of the report for detailed recommendations. If you have any questions concerning our findings, please call us.

Very truly yours,

Alan Kropp/ao

Alan Kropp, G.E.
Principal Engineer



AK/MT/ao

Copies: Addressee (5)

TABLE OF CONTENTS

Letter of Transmittal	1
INTRODUCTION	1
PROPOSED CONSTRUCTION	1
PURPOSE	1
SCOPE	2
INVESTIGATION PARTICIPANTS	3
METHODS OF INVESTIGATION	3
A. Review of Alan Kropp and Associates Report of June 27, 1988	3
B. Subsurface Exploration	3
C. Laboratory Testing	3
SITE CONDITIONS	4
A. Topography	4
B. Surficial Conditions	4
C. Soils	4
D. Bedrock	5
E. Landslides	6
F. Groundwater	6
G. Faults	6
EVALUATIONS AND CONCLUSIONS	7
A. Building Sites	7
B. Proposed Roadways	7
C. Bedrock	8
D. Existing Drainage Swale	8
E. Surficial Erosion	9
F. Utility Trench Excavations	9
RECOMMENDATIONS	9
A. Earthwork	9
A.1. Clearing and Site Preparation	9
A.2. Subgrade Preparation	10
A.3. Material for Fill	10
A.4. Compaction	10
A.5. Trench Backfill	11
A.6. Slopes	12
A.7. Fill Placement on Slopes	12

B.	Drainage and Erosion Control	12
B.1.	Surface Gradients	12
B.2.	Roof Water	12
B.3.	Water on Slopes	13
B.4.	Drainage of Fill Keys and Benches	13
B.5.	Drainage of Slope Terraces	13
B.6.	Additional Drainage Measures	13
B.7.	Erosion Control	13
C.	Structures	14
C.1.	Retaining Wall	14
C.2.	Pier and Grade Beam Foundations	15
C.3.	Footing Foundations	16
C.4.	Slabs-on-Grade	16
D.	Plan Review	17
E.	Construction Observation	18
F.	Wet Weather Construction	19
G.	Future Performance	19

FIGURE 1 - SITE PLAN

APPENDIX A - SUBSURFACE INVESTIGATION

A-1

FIGURE A-1 - Key to Exploratory Boring Logs

Exploratory Boring Logs (A - C)

Table A-1 - Rock Hardness Criteria

Table A-2 - Rock Weathering Criteria

APPENDIX B - LABORATORY INVESTIGATION

B-1

APPENDIX C - DARWIN MYERS ASSOCIATES REPORT

APPENDIX D - BIBLIOGRAPHY

INTRODUCTION

In this report, we present the results of our geotechnical investigation for the proposed subdivision to be constructed on a vacant parcel in Oakland, California. This parcel is located at the northeastern corner of the intersection of Redwood Road and Crestmont Drive.

PROPOSED CONSTRUCTION

Based on our conversations with you, as well as on the information indicated on the preliminary plans, it is our understanding that approximately two-thirds of the property will be divided into sixteen lots on which single family homes will be constructed while sixteen townhomes will be constructed on the remainder of the parcel. A new street extending from Redwood Road will be built to provide access to fifteen of the single family home sites, and new driveways will be built from the street to serve the individual residences. In addition an access driveway with parking areas will be constructed off Crestmont Drive to serve the new townhomes and one of the single family homes.

A moderate amount of grading will be required to develop the subject site. Cut-and-fill operations in conjunction with construction of retaining walls will be necessary to establish the new street and the upslope single family residences. Fill retaining walls on the order of 5 to 12 feet in height will be required along the downslope side of the roadway while cut slope retaining walls up to about 12 feet in height will be required beneath the upslope residences in order to establish level garage areas. In addition, we understand that some grading operations to lower the ground surface elevation in the vicinity of the proposed townhomes is currently planned. Finally, a narrow gully that cuts across the northwestern side of the site will either be filled or cut away in order to develop several building sites.

PURPOSE

The purpose of this investigation was to build upon the preliminary information presented in our report of June 27, 1988. This additional work was performed in order to evaluate geotechnical suitability of the site for the proposed development, as well as to provide design and construction criteria for the site earthwork, drainage, building foundations, and retaining walls. We should note that pavement design was not performed during this study.

SCOPE

As outlined in our proposal dated July 14, 1988, the scope of work performed in this investigation to accomplish our stated purpose included:

- 1) A review of the information developed during the initial evaluation;
- 2) Subsurface exploration with both large and small diameter borings as well as test pits;
- 3) Laboratory testing of selected samples recovered from the small diameter borings;
- 4) Geotechnical analysis of the collected data; and
- 5) Preparation of this report.

This report has been prepared for the exclusive use of Mr. Frank Albanese and his consultants for specific application to the proposed development in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. In the event that any changes are made in the nature, design, or layout of the development, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after a period of three years without being reviewed by this office.

It should be noted that this report is subject to review by the City of Oakland. Therefore, although we have attempted to meet City requirements for geotechnical reports, we cannot guarantee that no additional geotechnical work will be required or that the tentative map will be approved on the basis of this report.

INVESTIGATION PARTICIPANTS

The geotechnical investigation for this project was conducted jointly by Alan Kropp and Associates and by Darwin Myers Associates. Alan Kropp and Associates performed the soil and foundation aspects of the project, while Darwin Myers Associates addressed the geological portions. The field work, data review, and report preparations performed by Darwin Myers Associates were done by Darwin Myers, Engineering Geologist. The text of the Darwin Myers Associates report is reproduced in its entirety in Appendix C, but excerpts of their general findings, as well as all of their recommendations, have been incorporated into the text of this report.

METHODS OF INVESTIGATION

A. Review of Alan Kropp and Associates Report of June 27, 1988

A geotechnical evaluation report was prepared by this firm on June 27, 1988 for the subject property. This report was titled "Geotechnical Evaluation, Redwood Road Parcel, Oakland, California". In preparation of that report, published geotechnical materials as well as documents in the City of Oakland files and previous consultants' reports were reviewed, aerial photographs were examined, and a reconnaissance of the site and adjacent properties was performed. Data obtained during the preparation of that report as well as the general findings of it were reviewed during the preparation of this investigation. For completeness, appropriate sections of that report are presented in the following sections of this report. A citation for this previous report can be found in Appendix D, Bibliography.

B. Subsurface Exploration

A subsurface investigation was performed in two stages. On July 12, 1988, the first stage of this program was performed using both a track-mounted drill rig and a track-mounted backhoe. Five 24-inch diameter exploratory borings were drilled to a maximum depth of 48 feet. Darwin Myers descended these holes and logged the in-place materials. In addition, on this date, eleven exploratory test pits were excavated. The materials exposed in the pit walls were also logged by Darwin Myers. The logs of the large diameter borings and the test pits are included in the report by Darwin Myers Associates which can be found in Appendix C. The second stage of our exploration program was performed on July 14, 1988 using truck-mounted 6-inch diameter continuous flight auger equipment. Three exploratory borings were drilled to a maximum depth of about 16 feet. The exploratory borings and test pits were located either in proposed building sites or in areas that presented some geotechnical concern. The approximate locations of the borings and test pits are shown on the Site Plan, Figure 1. Logs of the three small diameter borings, as well as other details regarding the subsurface exploration program, are included in Appendix A.

C. Laboratory Testing

Water content, Atterberg limits and percentage passing the No. 200 sieve tests were performed on appropriate surface and subsurface samples obtained during our subsurface exploration. Details of our laboratory tests, as well as the results of our tests, appear in Appendix B.

SITE CONDITIONS

A. Topography

The site is located on a portion of the California Coast Range locally known as the Oakland Hills. These hills are dissected by numerous small and large drainage swales. The property generally slopes toward the southwest. Elevations on the property range from approximately 870 feet along the northeastern property line to about 720 feet along the southwestern property line. Slopes on the property generally range from relatively level to about 2:1 (horizontal to vertical).

B. Surficial Conditions

At the time of our site reconnaissance, the site was vacant. However, several unpaved roadways cut across the property; these roadways provided access for the equipment used to perform our subsurface exploration. The site topography is dominated by a steep slope located along the eastern property line, then a moderately steep slope, followed by another steep slope. The toe of this final steep slope is located near the center of the property. Near the northern corner of the site a large swale is present. This swale trends in a westerly direction exiting the property at an elevation of about 800 feet. A number of large loose boulders were present in the swale. A relatively shallow erosional gully is present approximately 80 feet southeast of the northwestern property line. Finally, a small knoll approximately 30 vertical feet in height exists near the southern corner of the property.

Vegetation on the property generally consisted of sparse grasses and scattered brush except on the knoll where a relatively dense stand of oak trees is present. The approximate locations of the topographic features noted above are shown on the Site Plan, Figure 1.

C. Soils

The site can generally be divided into three distinct areas as far as soil development is concerned. The northeastern half of the site which is underlain by schist and serpentine bedrock generally appears to have approximately 1 to 3 feet of sandy clay and clayey sand soils overlying the bedrock. The surficial soils in the swale on the northern corner of the property generally consisted of 1 to 5 feet of sandy and gravelly fill overlying approximately 2 feet of native clayey sand. The fill materials appeared to be in a loose condition, indicative of little or no compaction during placement. Finally, the soils encountered in the borings drilled in the area of the driveway off Crestmont Drive generally encountered 4½ to 8 feet of stiff to very stiff sandy clays overlying bedrock. Detailed descriptions of the soils encountered in the large diameter exploratory borings and the test pits can be found at the end of the Darwin Myers Associates report which is included in Appendix C, while detailed descriptions of the soils encountered in the small diameter exploratory borings are presented in Appendix A.

SITE CONDITIONS

C. Soils (Continued)

The attached boring and pit logs, as well as related information, depict subsurface conditions only at the specific locations shown on the Site Plan and on the particular date designated on the logs. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes. The locations of the borings and pits were approximately determined by pacing, and the elevations were approximately determined by interpolation of topographic map contours; the locations and elevations should be considered accurate only to the degree implied by the methods used.

D. Bedrock

The property is located in the Oakland Hills within an outcrop belt of Franciscan serpentine, except for the southern corner of the property, which is mapped as Leona Rhyolite. The serpentine is generally soft and intensely sheared and can slide on slopes as low as 2:1 (horizontal to vertical) (Radbruch, 1969). In contrast, the Rhyolite bedrock generally is quite hard and blocky. It forms steep, knobby dissected hills and generally weathers to hard rock fragments in a clay matrix.

Our site reconnaissance and subsurface exploration of the site confirmed that the materials shown on the published geologic maps were present. Serpentine bedrock was noted over most of the property while the relatively small knoll located at the southern corner of the property was found to be composed of rhyolite. Within the area of serpentine, layers of blocky, hard serpentine and dense, competent serpentized schist were found. These harder more competent layers within the serpentine were generally located on the steep slopes while the softer, sheared serpentine was found on the more level areas.

More detailed descriptions of the bedrock materials encountered at the site can be found in the report by Darwin Myers Associates included in Appendix C. This report also includes a general geologic map of the area and a geologic map of the site.

SITE CONDITIONS (Continued)

E. Landslides

A photointerpretive landslide map issued by the U.S. Geological Survey (Nilsen, 1975) indicates that nearly all of the serpentine areas are part of a large landslide. Only a small portion of the serpentine located along the southwestern property line is not shown to be underlain by landslide material. In addition, this map shows that the rhyolite areas are not underlain by landslide materials. The primary focus of the Darwin Myers Associates report was to evaluate the hazards posed by the large mapped landslide. It appears that a level bench area near the northeastern property line was considered by Nilsen to be a possible slide area. However, our field reconnaissance of the area upslope of the bench, the inferred scarp area, indicates that this slope possesses a convex shape rather than the concave shape of a typical landslide scarp. In order to further aid our evaluation of this possible slide area, four large diameter exploratory test borings were drilled on the level bench. The primary objective of these exploratory test borings was to determine whether the bench was created by differential erosion and weathering of weak bedrock that was "sandwiched" between competent, erosion-resistant, serpentized schist; or whether the bench was evidence of a deep-seated, dormant bedrock slide. These large diameter borings encountered approximately one foot of soil that was underlain by soft hardness, flakey, foliated serpentine that extended to the maximum depth explored of 50 feet. Bedding of the bedrock that was encountered in combination with the fact that no obvious slide planes were found in the exploratory borings and the topography of the hypothesized scarp area generally lead to the conclusion that the bench is not a slide related feature.

F. Groundwater

No free groundwater was encountered in any of our borings or test pits at the time of excavation, and the borings and pits were backfilled immediately after excavation. It should be noted that the borings and pits may not have been left open for a sufficient period of time to establish equilibrium groundwater conditions. In addition, fluctuations in the groundwater level may occur due to variations in rainfall, temperature and other factors not evident at the time the measurements were made.

G. Faults

The San Francisco Bay Area is recognized by geologists and seismologists as one of the most active seismic regions in the United States. The significant earthquakes which occur in the Bay Area are associated with crustal movements along well defined active fault zones which trend in a northwesterly direction. The site is approximately 2700 feet northeast of the nearest trace of the active Hayward Fault (CDMG, 1982). In addition, the site is located about 20 miles northeast as well as 9 miles southwest of the active San Andreas and Calaveras Fault Zones, respectively (Jennings, 1975).

SITE CONDITIONS

G. Faults (Continued)

The most recently published geologic map of this area (Radbruch, 1969) indicates that a branching fault trace, which is not related to the Hayward fault is mapped across the site. This trace forms the contact between the Franciscan serpentine and the Leona rhyolite. As discussed earlier, bedrock exposed in existing slopes and our exploratory borings and test pits confirmed that these two rock types are present on the site. The approximate locations of these materials are mapped in the field as shown on the Site Plan, Figure 1.

EVALUATION AND CONCLUSIONS

From a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed development. However, all of the conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to avoid possible geotechnical problems. The primary considerations for geotechnical design at the site include potential hazards related to the soft serpentine bedrock exposed on portions of the eastern half of the property, soil and fill creep in the swale in the northern corner of the site, and surficial erosion of exposed soils and bedrock. Evaluations of these hazards, as well as discussions of other geotechnical aspects of the project, are presented below. Recommendations for geotechnical aspects of the development are presented in the next section of our report.

A. Building Sites

On Figure 1, we have shown the building sites that were indicated on your preliminary development plan. All of these sites appear to be located in stable areas; however, the recommendations made in the following sections of this report should be carefully followed in order to minimize the likelihood of these areas becoming unstable.

B. Proposed Roadways

The proposed roadway that will service the single family homes will extend onto the property from Redwood Road. The Site Plan currently shows the roadway alignment along the downslope of the level bench. This alignment will necessitate the construction of a wedge of fill supported by a retaining walls on the order of 5 to 12 feet in height. However, this alignment should eliminate the need to cut into the slope on the uphill side of the bench, which could undercut the resistant schist layers that are supporting weaker sheared serpentine on the slope above.

EVALUATION AND CONCLUSIONS (Continued)

C. Bedrock

In general four types of bedrock can be found on the property: soft, sheared serpentine; massive, blocky serpentine; dense, serpentized schist; and dense, hard rhyolite. The first three types of bedrock can be found on the eastern two-thirds of the site while the rhyolite is only present on the western third.

It generally appears that the soft sheared serpentine is present on the level bench on the eastern half of the site, "sandwiched" between massive, blocky serpentine and serpentized schist. The blocky serpentine and the serpentized schist have good slope stability characteristics while the soft, sheared serpentine generally has poor slope stability characteristics. It appears that the stronger more stable blocky serpentine and serpentized schist are acting to support the weaker, sheared serpentine and that these materials are vitally important to the stability of the bench. In our opinion, these more resistant schist and blocky serpentine layers are relatively thin and any cuts into them will likely reduce the amount of support they are providing to the weaker serpentine. Therefore, cut slopes in these areas should be avoided and any cuts for retaining walls should not be allowed to stand freely for any more than a short period of time. If cutting operations do expose the sheared serpentine material during site grading then a maximum slope of 3:1 (horizontal to vertical) should be used for finished slopes in these areas. If a maximum 3:1 slope is not feasible then we recommend that the sheared serpentine be overexcavated and replaced with engineered fill.

The hard rhyolite bedrock which underlies the knoll area on the southeastern corner of the property will be very difficult to excavate. Therefore, we recommend that grading in this area be kept to a minimum. If cutting operations are required in this area then appropriately sized excavating equipment should be employed.

D. Existing Drainage Swale

A portion of a large drainage swale passes across the northern corner of the site. Exploratory Test Pits 1 and 2 generally encountered 1 to 5 feet of fill soils overlying native soils which extended to depths of about 3.0 to 6.5 feet. The fill encountered in these pits appears to have been placed during the development of the subdivision to the north. It does not appear that these fill soils were keyed into competent materials when they were placed. Therefore, they could be subject to downslope creep movement as could the native soils that underlie them. However, because of the proximity of this swale to the proposed homes it does not appear that this creep movement will greatly impact any of the structures. Should any structures or parts of structures be located within the swale it will be necessary to design them to resist the anticipated creep movements.

EVALUATION AND CONCLUSIONS (Continued)

E. Surficial Erosion

A well defined, steep-sided erosion gully generally parallels the northwestern property line. The existing development plan indicates that several structures are to be located either adjacent to it or immediately over it. During site grading it is our understanding that the topographic expression of the gully will be removed either by cutting or filling it. In either case it does not appear that the gully will pose much of a geotechnical problem. However, the gully does graphically illustrate the erodability of the serpentine derived soils and the serpentine bedrock. Therefore, detailed erosion control plans should be developed for construction and plans should be developed for revegetation of the site after development has occurred. We should not that it has been our experience that serpentine soils inhibit the growth of most vegetation. Therefore, a landscape architect experienced with this type of soil should be consulted during preparation of revegetation plans.

F. Utility Trench Excavations

Because of the presence of rock at or near the ground surface over much of the site, trenching for utility lines may not be possible with conventional trenching equipment, such as backhoes with conventional buckets. Equipment with substantially more power or jackhammers may be required.

RECOMMENDATIONS

A. Earthwork

A.1. Clearing and Site Preparation

The site should be cleared of all obstructions including designated trees, any underground utility lines, and debris. Holes resulting from the removal of trees and underground obstructions that extend below the proposed finish grade should be cleared and backfilled with suitable material compacted to the requirements given below under Item A.6., Compaction. We recommend that the removal of any major trees and the backfilling operations for these excavations be carried out under the observation of the soil engineer, so that all roots are removed and the excavations are properly backfilled.

After clearing, the portions of the site to be developed which contain surface vegetation or organic laden topsoil should be stripped to an appropriate depth to remove these materials. At the time of our field investigation, we estimated that a stripping depth of approximately 2 inches would be required. The amount of actual stripping should be determined in the field by the soil engineer at the time of construction. The cleared and stripped materials should be removed from the site or stockpiled for later use in landscaping if desired.

RECOMMENDATIONS (Continued)**A.2. Subgrade Preparation**

After any site excavations are made, the exposed soils in those areas to receive structural fill, slabs-on-grade or pavements should be scarified to a depth of 6 inches, moisture conditioned to slightly above optimum water content and compacted to the requirements for structural fill.

A.3. Material for Fill

All on-site soils below the stripped layer and having an organic content of less than 3 percent by volume can be used as fill. However, all fill placed at the site including on-site soils should not contain rocks or lumps larger than 6 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. In addition, any required import fill should be predominantly granular with a plasticity index of 12 or less. We recommend that the contractor submit a sample of any proposed imported materials for our review and approval prior to transporting these materials to the site.

A.4. Compaction

All structural fill less than 5 feet thick should be compacted to at least 90 percent relative compaction as determined by ASTM Test Designation D 1557-78. Structural fill or wall backfill greater than 5 feet high should be compacted to at least 95 percent relative compaction. Fill material should be spread and compacted in lifts not exceeding 8 inches in uncompacted thickness.

RECOMMENDATIONS (Continued)**A.5. Trench Backfill**

Pipeline trenches should be backfilled with fill placed in lifts not exceeding 8 inches in uncompacted thickness. The following table presents our recommendations for compaction requirements.

Condition	Trench Depth (ft)	<u>Compaction Requirements*</u>	
		Native Soils	Granular Import Soils
Non-Improved Area	Any depth	85%	90%
Improved Area	Less than 5-feet	Upper 3-feet 90% lower 2-feet 85%	Entire backfill 90%
	5-feet or greater but less than 8-feet	Entire backfill 90%	Entire backfill 95%
	8-feet or greater	Entire backfill 95%	Entire backfill 95%

*Assumes a reasonable "cushion" layer around the pipe.

If imported granular soil is used, sufficient water should be added during the trench backfilling operations to prevent the soil from "bulking" during compaction. In all of the cases outlined above, we recommend that the upper 6-inches of subgrade under pavement and baserock be compacted to at least 95% relative compaction. All compaction operations should be performed by mechanical means only. We recommend against jetting unless the backfill material is granular (sand or gravel) and the water used in jetting is able to rapidly flow out of the trench.

If granular backfill is used for utility trenches, we recommend that an impermeable plug or mastic sealant be used where utilities enter the building to minimize the potential for free water or moisture to enter below the building. Finally, because of the potential for catastrophic collapse of trench walls we recommend that the contractor carefully evaluate their stability of all trenches and use temporary shoring where appropriate. The design and installation of the temporary shoring should be wholly the responsibility of the contractor. In addition, all state and local regulations governing safety around such excavations should be carefully followed.

RECOMMENDATIONS (Continued)

A.6. Slopes

We recommend that all fill slopes or cut slopes in rhyolite, serpentized schist, or blocky serpentine bedrock have a maximum inclination of 2:1 (horizontal to vertical); cut slopes in soils or sheared serpentine should not be steeper than 3:1. Cut slopes should be contour rounded to provide a smooth transition to natural topography. The surface of all fill slopes should be either back-rolled, or compacted beyond the limits of the slope and cut back in order to achieve satisfactory compaction. We should note that it is our recommendation that cutting operations on the northeastern half of the site be kept to a minimum in order to minimize the likelihood of destabilizing the sheared serpentine bedrock located in the bench area.

Any cut or fill slopes which are greater than 25 feet high, measured vertically, should contain horizontal drainage terraces at least 8 feet wide at intervals of no more than 25 feet vertically. When only one terrace is required, it should be located at mid-slope. We recommend that all cut slopes be evaluated in the field during construction to determine if any adverse geotechnical conditions are exposed.

A.7. Fill Placement on Slopes

Where fills are to be placed on existing slopes having inclinations steeper than 5:1, a base key should be excavated into competent materials at the toe of the new fill slope. The depth and extent of keys should be determined by the soil engineer in the field at the time of construction. However, all base keys should be at least 10 feet wide and should slope back into the hillside at a gradient of at least 2 percent.

In addition, if the fill slope is greater than 10 feet high, benches should be excavated into the slope before placing the fill at vertical intervals of no more than 10 feet. These benches should be at least 10 feet wide. However, the actual dimensions of the benches should be determined by the soil engineer at the time of construction.

B. Drainage and Erosion Control

B.1. Surface Gradients

Positive surface gradients should be provided in all areas of the development. All lots should be graded to provide for runoff of surface water and direct water away from buildings toward suitable discharge facilities. Ponding of surface water should not be allowed adjacent to the structures or on pavements. The Landscape Architect on the project should be informed of this recommendation, and the grading contractor and landscape contractor on the job advised of this during construction.

B.2. Roof Water

Continuous gutters and downspouts leading to closed pipes should be provided at each structure; these pipes should transmit the water to an appropriate discharge facility.

RECOMMENDATIONS (Continued)**B.3. Water on Slopes**

Drainage berms or interceptor ditches should be provided at the top of all cut or fill slopes. The berms or ditches should drain to appropriate discharge facilities. In no case should water be allowed to flow over the top of cut or fill slopes.

B.4. Drainage of Fill Keys and Benches

The key of all fill slopes greater than 10 feet high which are placed on natural slopes should contain a perforated pipe to drain the key. In addition, it may also be necessary to construct drains at the base of benches below the new fill; however, a decision regarding the need for these drains should be made in the field at the time of construction.

B.5. Drainage of Slope Terraces

Horizontal drainage terraces on the surface of cut or fill slopes should be provided with paved "V" ditches. These ditches should slope at a gradient of at least 2 percent to an appropriate discharge facility.

B.6. Additional Drainage Measures

If areas are exposed during the grading operations which indicate sources of seepage or instability, additional drainage measures will be recommended by the soil engineer.

B.7. Erosion Control

Grading should be restricted to the dry season, and basins should be provided in padded areas (eg. cul-de-sac) to detain runoff and trap sediments. All graded areas should be protected from erosion by spraying a hydromulch with a tackifier on the slopes prior to the onset of winter rains. On slopes steeper than 2½:1, we recommend the use of a slope protection fabric. We should note that because of the serpentine bedrock and serpentine derived soils at the site, establishing vegetation will be difficult. A landscape architect experienced with these types of soils should be consulted when planning the types of plantings and the seed mixture for the hydromulching.

RECOMMENDATIONS (Continued)**C. Structures****C.1. Retaining Wall**

We recommend that restrained and unrestrained walls for cut slopes with a level surface or with a sloping surface flatter than 4:1 above the wall be designed to resist an equivalent fluid pressure of 50 and 35 pounds per cubic foot, respectively. Where the sloping surface above the wall is at an inclination of 2:1, restrained and unrestrained walls for cut slopes should be designed to resist an equivalent fluid pressure of 75 and 55 pounds per cubic foot, respectively. For walls with a sloping surface at an inclination between 4:1 and 2:1, a straight line interpolation between the indicated values may be used. We recommend that restrained and unrestrained walls for fill slopes with a level surface or with a sloping surface flatter than 4:1 above the wall be designed to resist an equivalent fluid pressure of 60 and 40 pounds per cubic foot, respectively. Where the sloping surface is at an inclination of 2:1 restrained and unrestrained walls for fill slopes should be designed to resist an equivalent fluid pressure of 80 and 60 pounds per cubic foot, respectively. If the designer determines that there are surcharge loads on the walls, the walls should be designed to resist an additional uniform pressure equivalent to one-half or one-third of the maximum anticipated surcharge load applied to the surface behind restrained or unrestrained walls, respectively.

The above pressures assume that sufficient drainage will be provided behind the walls to prevent the build-up of hydrostatic pressures from surface and subsurface water infiltration. Adequate drainage may be provided by a subdrain system consisting of a four-inch perforated hardened plastic pipe bedded in open-graded rock wrapped in an approved, polyester, non-woven geotextile. The permeable material placed behind the wall should be at least one foot in width and should extend to within one foot of finished grade. The upper one foot of backfill should consist of on-site, compacted, impervious soils. The subdrain pipe should be connected to a system of closed pipes that lead to a suitable discharge facility. Cleanouts should be provided at the upslope end of the perforated pipe and at the junction of the perforated and solid pipes.

A lined surface ditch should be provided behind the wall. This ditch, which will collect runoff water from the slope, should be sloped to drain to a catch basin leading to a solid pipe; the solid pipe should extend to a suitable discharge facility. The top of the walls should extend at least one foot above the ditch. All structural backfill placed behind the walls should be compacted to at least 90 percent relative compaction.

RECOMMENDATIONS (Continued)**C.2. Pier and Grade Beam Foundations**

We recommend that the proposed residences and retaining walls restraining fill slopes be supported on drilled, cast-in-place, straight-shaft piers that are designed to develop their load carrying capacity through friction between the sides of the piers and the surrounding subsurface materials. Friction piers should have a minimum diameter of 16 inches, and there should be at least a three diameter center-to-center spacing between adjacent piers.

The piers should generally extend to a depth adequate to provide at least 8 feet of embedment into bedrock. Since bedrock was encountered at depths of 1 to 8 feet in the exploratory work at the building sites, the piers for the residences should generally extend to a minimum depth of about 8 to 16 feet below the existing ground surface. To determine whether these depths are adequate to carry the structural loads of the residences, allowable skin friction values of 800 pounds per square foot for dead plus live loads and 1200 pounds per square foot for all loads, including wind or seismic, can be used in the bedrock. These values can be used starting at the bedrock surface.

To minimize damage resulting from potential "creep" type movement, we recommend that all piers be designed to resist a uniform lateral pressure of 500 pounds per square foot acting against the projected diameter of the pier to a depth of 3 feet below the ground surface.

The bottom of pier excavations should be dry and reasonably free of loose cuttings and soil fall-in prior to installing reinforcing steel and placing concrete. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied to the bottom of the hole. Since the actual depths of the piers will have to be determined in the field, we recommend that the excavation of piers be performed under the observation of our firm to confirm that they are constructed in accordance with the recommendations presented herein.

The piers should be tied together with grade beams that extend up and down the slope between the piers, as well as across the slope between the piers. Maximum horizontal distance between the grade beams should be in the range of 20 feet. The grade beams should be designed to span between the piers in accordance with structural requirements. In order to minimize the possible detrimental effects of the expansive soils we recommend that either a 4 inch void be created at the bottom of all grade beams or the grade beam be designed to resist an uplift pressure of 2000 pounds per square foot. If a void is used, our firm should review and approve the method of forming the void prior to construction of the grade beams.

The floor system should be structurally supported and derive all of its support from the pier and grade beam foundation.

Lateral loads on the piers may be resisted by passive pressures acting against the sides of the piers. We recommend a passive pressure equal to an equivalent fluid weighing 400 pounds per square foot per foot of depth to a maximum value of 4000 pounds per square foot. This value can be assumed to be acting against 1½ times the diameter of the individual pier shafts starting 3 feet below the bottom of grade beams.

RECOMMENDATIONS (Continued)**C.3. Footing Foundations**

We recommend that retaining walls in areas of cut be supported on conventional, continuous and isolated spread footings that bear on bedrock.

All footings should extend at least 16 inches below the lowest adjacent finished grade. In addition, any footings located adjacent to utility trenches should also have their bearing surfaces below an imaginary 1:1 (horizontal to vertical) plane projected upward from the edge of the bottom of the adjacent trench.

At the above depths, the footings may be designed for an allowable bearing pressure of 2000 pounds per square foot due to dead loads, 3000 pounds per square foot due to dead plus live loads, and 4000 pounds per square foot for all loads, including wind or seismic. These allowable bearing pressures are net values; therefore, the weight of the footings can be neglected for design purposes. However, all footing should have a minimum width of 14 inches, and all continuous footings should be tied together with reinforcing steel.

C.4. Slabs-on Grade

We recommend that slabs-on-grade be supported on a minimum of 6-inches of compacted, non-expansive fill. It is likely that cutting operations in the area of rhyolite bedrock will produce good non-expansive fill. The subgrade surface should be proof-rolled to provide a smooth, firm surface for slab support.

The slabs should be appropriately reinforced according to structural requirements; concentrated loads may require additional reinforcing. Minor movement of the concrete slab with resulting cracking should be expected. The recommendations presented above, if properly implemented, should help minimize the magnitude of this cracking.

In any slab area where minor floor wetness would be undesirable, 4 inches of free draining gravel should be placed beneath the floor slab to serve as a capillary barrier between the subgrade material and the slab. An impermeable membrane should be placed over the gravel, and the membrane should be covered with 2 inches of sand to protect it during construction. the capillary barrier may be used in lieu of the 6-inches of non-expansive import fill.

RECOMMENDATIONS (Continued)**D. Plan Review**

We recommend that our firm be provided the opportunity for a general review of geotechnical aspects of the final plans and specifications for this project in order that the geotechnical recommendations may be properly interpreted and implemented in the design and specifications. Specific items that we recommend our firm review and that the plans should contain, include, but are not limited to, the following:

- 1) General: A citation of this foundation investigation report (in the general notes.)
- 2) Mass Grading: This geotechnical investigation report should be cited in the general notes.
- 3) Foundations: Pier dimensions and depth of embedment, as well as footing dimensions and depth.
- 4) Slabs: Depth of scarification required, import fill depth, baserock or drainrock depth, vapor barrier and sand as required.
- 5) Retaining walls: Foundation requirements (as noted in Item 3 above), wall drain system, impermeable plug above drain, surface ditch and freeboard as needed.
- 6) Drainage: Gradient away from structure, downspout collector pipes, surface or subdrain collector system, discharge location.

If our firm is not accorded the privilege of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations.

We recommend that our firm be provided the opportunity for a general review of geotechnical aspects of the final plans and specifications for the subject work at this site in order that the geotechnical recommendations may be properly interpreted and implemented in the design and specifications. If our firm is not accorded the privilege of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations.

RECOMMENDATIONS (Continued)**E. Construction Observation**

The analysis and recommendations submitted in this report are based in part upon the data obtained from the eight soil borings and eleven test pits. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent, it will be necessary to re-evaluate the recommendations of this report.

We recommend that our firm be retained to provide geotechnical engineering services during the earthwork, drainage, and foundation construction phases of the work. This is to observe compliance with the design concepts, specifications and recommendations and to allow design changes in the event that subsurface conditions differ from that anticipated prior to the start of construction.

We also recommend that a representative of our firm observe the following aspects of the construction:

- 1) Site clearing and stripping;
- 2) Placement and compaction of any engineered fill;
- 3) Subgrade scarification and recompaction;
- 4) Excavation of footing trenches;
- 5) Drilling of straight shaft pier holes;
- 6) Placement and compaction of sewer, storm drain, and utility trench backfill;
- 7) Installation of drainage system behind retaining walls;
- 8) Construction of surface ditch uphill of new retaining walls;
- 9) Connection of building downspouts to solid discharge pipes; and
- 10) Finished grading and landscape grading around the perimeter of the structure.

In order to effectively accomplish these observations we recommend that a pre-construction meeting be held to explain our recommendations to the contractor and develop a mechanism for proper communications throughout the project. We also request that the client or his representative (the contractor) contact our firm at least 48 hours prior to the commencement of any of the items listed above. If our representative makes a site visit in response to a request from the client or his representative and it turns out that the visit was not necessary, our charges for the visit will still be applied.

RECOMMENDATIONS (Continued)

F. Wet Weather Construction

Although it is possible that construction can proceed during or immediately following the wet winter months, a number of geotechnical problems may occur which may increase costs and cause project delays. The water content of on-site soils may increase during the winter and rise significantly above optimum moisture content for compaction of subgrade or backfill materials. If this occurs, the contractor may be unable to achieve the recommended levels of compaction without using special measures and would likely have to:

- 1) Wait until the materials dry enough to become workable;
- 2) Dispose of the wet soils and import dry soils; or
- 3) Use lime or cement on the native materials to absorb water and achieve workability.

If trenches or excavations are open during winter rains, then caving of the trench or excavation walls may occur. Also, if the trenches fill with water during construction or if saturated materials are encountered at the anticipated bottom of the trenches or excavation, the trenches may need to be extended to greater depths to reach adequate bearing than would be necessary if dry weather construction took place.

We should also note that it has been our experience that increased clean-up costs will occur, and greater safety hazards will exist if the work proceeds during the wet winter months.

G. Future Performance

All people who own or occupy homes on hillsides should realize that landslide movements are always a possibility, although generally the likelihood is very low that such an event will actually occur. The probability that landsliding will occur is substantially reduced by the proper maintenance of drainage measures at the site (see detailed discussion in Appendix A). Therefore, the homeowner should recognize their responsibility for performing such maintenance. Consequently, we recommend that a copy of our report be provided to any future homeowners of the property if the home is sold.

Even if proper maintenance is performed, landsliding may still occur during very heavy rains, breaks in water lines, or other severe environmental conditions. As noted earlier, the likelihood of landsliding is very low, but because the consequences of such an event could be costly, we recommend that landslide insurance for the property be obtained.

APPENDIX A - SUBSURFACE INVESTIGATION

Our subsurface exploration program was performed in two stages. On July 12, 1988, the first stage of our program was performed using both a track-mounted, drill rig and a track-mounted backhoe. Five 24-inch diameter exploratory borings were drilled to a maximum depth of 50 feet. In addition, 11 exoratory test pits were excavated with the backhoe to a maximum depth of 8 feet. On July 14, 1988 the second stage of our investigation was performed using truck-mounted continuous flight, auger equipment. Three 6-inch diameter exploratory borings were drilled to a maximum depth of 16 feet. The locations of the exploratory borings and test pits are shown on the Site Plan, Figure 1. The materials encountered during the first stage of our exploration program were continuously logged in the field by Darwin Myers while the materials encountered in the exploratory borings drilled during the second stage were logged in the field by our representative. The soils are described in accordance with the Unified Soil Classification System (ASTM D-2487), and colors of each sample were assigned using the Munsell Soil Color Charts. The logs of the borings drilled during the second stage of our exploration program, as well as a key for classification of the soil (Figure A-1), are included as a part of this Appendix. In addition, tables of Rock Hardness Criteria (Table A-1) and Rock Weathering Criteria (Table A-2) are also included. Logs of the borings and test pits from the first stage of our exploration program can be found at the end of the Darwin Myers Associates report found in Appendix C.

Representative material samples were obtained from the small diameter exploratory borings at selected depths appropriate to the soil investigation. Disturbed samples were obtained using the 2-inch O.D. Split Spoon sampler. All samples were transmitted to our laboratory for evaluation and appropriate testing. The large diameter borings were logged by our consulting engineering geologist. He descended the holes to log the in-place relatively undisturbed soils.



Split Spoon

Resistance blow counts were obtained with the samplers by dropping a 140-pound hammer through a 30-inch free fall. The sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. These blow counts are the standard penetration resistance values.

The attached boring logs and related information show our interpretation of the subsurface conditions at the dates and locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations and times.

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
			HIGHLY ORGANIC SOILS	

DEFINITION OF TERMS

U.S. STANDARD SERIES SIEVE : CLEAR SQUARE SIEVE OPENINGS

200 40 10 4 3/4" 3" 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

GRAIN SIZES

SANDS AND GRAVELS	BLOWS/FOOT [†]
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

SILTS AND CLAYS	STRENGTH [†]	BLOWS/FOOT [†]
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

CONSISTENCY

[†] Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

[†] Unconfined compressive strength in tons/sq. ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation.

ALAN KROPP & ASSOCIATES Geotechnical Consultants	KEY TO EXPLORATORY BORING LOGS Unified Soil Classification System (ASTM D-2487)		
	OAKCREST HOMES Oakland, California		
	PROJECT NO.	DATE	FIGURE A-1
	1025-1A	August 1988	

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION --		LOGGED BY GS				
DEPTH TO GROUNDWATER Not Encountered				BORING DIAMETER 6 Inches		DATE DRILLED 7/14/88				
DESCRIPTION AND CLASSIFICATION				DEPTH (feet)	JARS	SACKS	SPLIT SPOON	SHELBY TUBE	MOISTURE CONTENT %	PENETRATION RESISTANCE BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
CLAY, sandy, silty - occasional angular serpentine fragments to 1 foot Liquid Limit = 44 % Plasticity Index = 20% Passing No. 200 Sieve = 53%	Dark Grey to Dark Olive Grey	VERY STIFF	CL	1	X				17	22
				2						
				3						
				4	X				19	17
				5						
				6	X				17	18
				7						
				8						
SERPENTINE, severely weathered and highly fractured, silty	Dark Olive Grey to Black	VERY SOFT HARDNESS	BR	9						
				10	X				15	54
				11						
				12						
				13						
				14						
				15						
				16	X				11	90 11"

Bottom of Boring at 16 Feet

NOTES

1. No groundwater was encountered at the time of drilling, and the boring was backfilled immediately after drilling. (See text for discussion.)
2. The stratification line represents the approximate boundary between material types, and the transition may be gradual.
3. An explanation of the datum used for the boring elevations is presented on Figure 1.

ALAN KROPP & ASSOCIATES

Geotechnical Consultants

EXPLORATORY BORING LOG

OAKCREST HOMES
Oakland, California

PROJECT NO.

DATE

SHEET NO.

BORING
NO

1025-1A

August 1988

1 of 1

A

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION --			LOGGED BY GS			
DEPTH TO GROUNDWATER Not Encountered				BORING DIAMETER 6 Inches			DATE DRILLED 7/14/88			
DESCRIPTION AND CLASSIFICATION				DEPTH (feet)	JARS	SACKS	SPLIT SPOON	SHELBY TUBE	MOISTURE CONTENT %	PENETRATION RESISTANCE BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
CLAY, sandy, silty	Brown	STIFF	CL	1						
Passing No. 200 Sieve = 61%		VERY STIFF		2	X				11	25
					3					
SERPENTINE, severely weathered and highly fractured, clayey	Olive Grey to Black	VERY SOFT	BR	4	X				16	28
		HARDNESS		5						
				6	X				9	65

Bottom of Boring at 6½ Feet

NOTES

1. No groundwater was encountered at the time of drilling, and the boring was backfilled immediately after drilling. (See text for discussion.)
2. The stratification line represents the approximate boundary between material types, and the transition may be gradual.
3. An explanation of the datum used for the boring elevations is presented on Figure 1.

ALAN KROPP & ASSOCIATES

Geotechnical Consultants

EXPLORATORY BORING LOG

OAKCREST HOMES
Oakland, California

PROJECT NO.

DATE

SHEET NO.

BORING NO.

1025-1A

August 1988

1 of 1

B

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION --		LOGGED BY GS				
DEPTH TO GROUNDWATER Not Encountered				BORING DIAMETER 6 Inches		DATE DRILLED 7/14/88				
DESCRIPTION AND CLASSIFICATION				DEPTH (feet)	JARS	SACKS	SPLIT SPOON	SHELBY TUBE	MOISTURE CONTENT %	PENETRATION RESISTANCE BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
CLAY, sandy, silty - abundant angular serpentine fragments to 1 inch	Olive Grey	VERY STIFF	CL	1						
				2	X				14	26
				3						
				4	X				17	22
SERPENTINE, severely weathered and highly fractured, clayey	Olive	SOFT HARDNESS	BR	5	X				20	80 9"

Bottom of Boring at
5 Feet 9 Inches

NOTES

1. No groundwater was encountered at the time of drilling, and the boring was backfilled immediately after drilling. (See text for discussion.)
2. The stratification line represents the approximate boundary between material types, and the transition may be gradual.
3. An explanation of the datum used for the boring elevations is presented on Figure 1.

ALAN KROPP & ASSOCIATES

Geotechnical Consultants

EXPLORATORY BORING LOG

OAKCREST HOMES
Oakland, California

PROJECT NO.	DATE	SHEET NO.	BORING NO
1025-1A	August 1988	1 OF 1	C

TABLE A-1

ROCK HARDNESS CRITERIA

Very Hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimen requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately Hard	Can be scratched with knife or pick. Gouges or grooves to 1/4 inch deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1 inch maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very Soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1 inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Subsurface Manual for Design and Construction of Foundations of Buildings, 1976,
Published by the American Society of Civil Engineers.

TABLE A-2

ROCK WEATHERING CRITERIA

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very Slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately Severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very Severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

Subsurface Manual for Design and Construction of Foundations of Buildings, 1976,
Published by the American Society of Civil Engineers.

APPENDIX B - LABORATORY INVESTIGATION

The laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site.

1. Water Content

The natural water content was determined on 11 samples of the materials recovered from the borings in accordance with ASTM Test Designation D-2216. These water contents are recorded on the boring logs at the appropriate sample depths.

2. Atterberg Limits

Atterberg Limit determinations were performed on 1 sample of the subsurface soils to determine the range of water contents over which these materials exhibit plasticity. The Atterberg Limits were determined in accordance with ASTM Test Designations D-4318. These values are used to classify the soil in accordance with the Unified Soil Classification System and to indicate the soil's compressibility and expansion potential. The results of this test are presented on Figure B-1 and on the boring logs at the appropriate sample depth.

3. Percent Passing No. 200 Sieve

The percent passing the No. 200 sieve was determined on 2 samples of the subsurface soils to aid in the classification of these soils. These tests were performed in accordance with ASTM Test Designation D-1140. The results of these tests are also shown on the boring logs at the appropriate sample depths.

APPENDIX C - DARWIN MYERS REPORT

LANDSLIDE HAZARD INVESTIGATION
OAKCREST PLANNED UNIT DEVELOPMENT
REDWOOD ROAD AREA
OAKLAND CA
DMA REPORT 2010.88

AUGUST 1988



DARWIN MYERS ASSOCIATES



DARWIN MYERS ASSOCIATES

ENVIRONMENTAL RESEARCH ■ ENGINEERING GEOLOGY

8 August 1988

Mr. Alan Kropp
Alan Kropp & Associates
2054 University Avenue
Berkeley CA 94704

Subject: Landslide Hazard Investigation
 Oakcrest Planned Unit Development
 Redwood Road Area
 Oakland CA

Dear Alan:

This letter report is organized to first provide an overview of published mapping. We then present the results of our field observations and an evaluation of the data.

GEOLOGIC SETTING

1. Bedrock Geology

The most recent bedrock geologic mapping of the Oakland East Quadrangle is that of the USGS (Radbruch, 1969). To enhance readability, this map has been photographically enlarged from its published scale of 1"=2000' to 1"=1000" (see Figure 1).

According to the USGS map, the site is within the outcrop belt of Franciscan serpentine (sp), with the exception of the southwest corner of the property, which is mapped as Leona Rhyolite (Tl). The main traces of the Hayward fault are mapped approximately 2500 and 3500 feet west of the site. A branching fault trace which is not related to the Hayward fault is mapped across the site. This trace forms the contact of the Franciscan serpentine (sp) with the Leona Rhyolite (Tl).

Figure 1 is a general purpose geologic map that is not intended to serve as a detailed fault trace map, or as a primary source of information on landslides. Rather, it is intended to provide insight into the distribution of bedrock and surficial deposits, along with providing comments on the engineering characteristics of the mapped units. Radbruch's comments on the serpentinite and rhyolite are as follows:

Serpentinite. Generally soft and intensely sheared. Weathering difficult to detect. Areas mapped as serpentine may include small amounts of Leona Rhyolite and Franciscan Formation too small to be mapped separately. Intensely

sheared serpentine can slide in slopes as low as 2:1.

Rhyolite. . Forms steep, knobby dissected hills. Weathering as much as 30 feet deep; highly weathered rock can consist of loose fragments in a clay matrix. Slope stability and foundation conditions good.

2. Fault Trace Map

In 1974, Radbruch-Hall issued a map that reportedly shows active traces of the Hayward fault. In the vicinity of the site, the Hayward fault is represented as sub-parallel strands that pass approximately 2500 and 3500 feet west of the site. The traces are represented by short dashes indicating that the location shown is inferred. Annotations along the mapped fault to the northwest indicate that sheared rock has been identified at various localities on the floor of the Highway 13 trough. Radbruch's interpretation is based chiefly on limited outcrop data and field geologic mapping. No subsurface exploration was undertaken, and the investigation did not include photogeologic interpretation. Consequently, this map is used as a source of information by the geologic community, but it is not considered to be the final authority.

In the aftermath of the 1971 San Fernando earthquake, the California Legislature enacted the Alquist-Priolo Special Studies Zone Act. This act required the State Geologist to define Special Studies Zones along all faults that were known to be active and sufficiently well defined.

3. Special Studies Zones

The purpose of the Special Studies Zones (SSZ) maps is to ensure that development in proximity to known active faults gives adequate consideration to the hazard of surface fault rupture. The reports must be prepared by a geologist registered in the State of California. The local jurisdiction is required to provide peer review of the report, performed by a registered geologist. Copies of all consultant prepared reports, along with evidence of peer review, must be sent to the California Division of Mines and Geology. This requirement provides the CDMG with a basis for modifying the boundary of the SSZ, as detailed studies define the precise location of the fault.

Figure 2 shows the SSZ in the vicinity of the site. Also shown is the location of the fault traces that were the basis for determining the width and orientation of the SSZ. This map has been photographically enlarged from its published scale of 1"=2000' to 1"=1000'. Features that can be seen on the map are as follows:

1. The SSZ is 2100 feet wide in the vicinity of the site.



2. Two (2) long, nearly continuous fault traces are shown in the SSZ. According to the explanation on the official map, the long dash symbol indicates the location is approximate; short dashes indicate the location is inferred; a query indicates additional uncertainty.
3. The project site is 2000 feet east of the SSZ and approximately 2700 feet from the nearest suspected trace of the Hayward fault.

4. Landslides

The USGS has prepared photointerpretive landslide maps of the entire San Francisco Bay Region (Nilsen, 1975). According to the map of the Oakland East Quad, the portion of the site that is mapped as serpentine by Radbruch is within a photointerpretive landslide. The Nilsen maps are sometimes criticized because they are based solely on interpretation of 1960's photography. Slides occurring in the 1970's and 1980's are not shown, and the slides that are shown have not been field checked by the USGS. The slides are not classified by activity status, depth of slide plane or type of slide deposit. Some slides are queried, indicating that the interpretation of the feature is uncertain. Nevertheless, the map serves its intended function of "red-flagging" areas requiring specific study.

SITE INVESTIGATION

1. Methods of Investigation

Your firm retained a drilling contractor to drill large-diameter borings and an excavating contractor to excavate test pits (and backfill the borings). We logged the borings and test pits. Additionally, we interpreted aerial photographs and performed a reconnaissance of the site, including the mapping of bedrock outcrops.

2. Photointerpretation

Three (3) sets of photographs examined with a mirror stereoscope equipped with 3X and 8X binoculars. The objective of this phase of the study was to examine geomorphic features on the site that had been interpreted as slide features by Nilsen. The photos examined were flown in 1957, 1969 and 1983. They span a 26-year period and include photos comparable to those examined by Nilsen, as well as recent aerials. A complete citation of the photographs is presented in the bibliography and our comments are as follows:



- a) 1957 photographs predate realignment of Redwood Road. Crestmont was constructed, but no lots had been developed. The single-family residential project north of the site had been recently completed, and the limit of fill could be clearly seen on the photographs. With regard to the site, there were northwest-trending tonal changes reflecting variations in the density and type of vegetative cover, as well as northwest trending benches separated by steep, rocky slopes. Parallel, S45°W trending blocks of erosion-resistant rock are superimposed on northwest trending structural grain. These blocks represent an element that adds complexity to interpretation of the photographs. A swale in the northwest corner of the site is an area of soil creep and concentrated runoff.
- b) The 1969 photographs are very clear, and they post-date realignment of Redwood Road. On-site, the vegetation contrasts are less distinct, but the northwest structural grain is still evident, and no evidence of sliding was observed that occurred during the period 1957 - 1969.
- c) The 1983 photographs are very similar in their overall aspect to the 1969 photographs. They show no evidence of active sliding during the period 1969-1983, and the dominant landforms on the property are a northwest trending bench and saddle separated by a steep, rocky intervening slope.

Clearly, the bench was considered to be a possible slide area by Nilsen. However, the inferred scarp area overlooking the bench possesses a convex shape rather than concave, the lateral limits of the photointerpretive slide are unclear, and the toe has no geomorphic expression.

3. Field Reconnaissance

We made a field reconnaissance of the site on 12 July 1988. At that time, the various geomorphic elements of the site were examined. They are described individually below. (The geographic location of the features described herein are shown in Plate I.

- a) Knoll. Located in the southwest corner of the site, the knoll possesses discontinuous outcrops of Leona Rhyolite. Its vegetation (oak woodland) and geomorphic expression are distinct from the remainder of the site. It appears to be composed of competent, in situ bedrock.
- b) Saddle. The saddle was graded in the mid-1950's to create a pad. There is little vegetation in the saddle, even though the grading occurred 30+ years ago, which suggests the area is underlain at-depth by serpentine.



- c) Slope. A steep, rocky slope consisting of serpentized schist with associated serpentine pods overlooks the saddle. Foliation in the slope generally strikes northwest and is vertically dipping $\pm$. The schist is hard, competent rock.
- d) Bench. The bench possesses a slope of approximately 25 percent. It contains only a growth of short annual grasses and other forbs, which is consistent with serpentine bedrock at-depth. No rock outcrops or scarp-lets were observed on the bench.
- e) Scarp. A rock slope is present at the east boundary of the property that was interpreted by Nilsen as a scarp. Serpentinized schist outcrops intermittently on the slope. The dominant foliation strikes N20° to 45°W, and with vertical dips $\pm$. The lithology and orientation of foliation in these outcrops is very similar to the serpentized schist that overlooks the saddle.
- f) Tectonic Block. A southwest-trending block of serpentine is present in the north portion of the site. It is elongate in a southwest direction, bounded on the south by an inactive watercourse and on the north by a deep ravine. Outcrops on this block consist chiefly of a light green, massive serpentine that possesses a very high compressive strength.

4. Subsurface Exploration

The subsurface phase of this study consisted of logging five (5) borings and 11 test pits. Logs of borings and test pits are presented in Appendix A, and their location, along with our interpretation of site conditions is presented in Plate I, Geologic Reconnaissance Map. The logs are self-explanatory, but some comments on our strategy for locating boreholes and test pits are warranted, followed by our evaluation of the data.

- a) Boreholes. The primary objective of the boreholes was to determine if the bench owed its origin to differential erosion and weathering of weak bedrock that was "sandwiched" between competent, erosion-resistant, serpentized schist; or whether the bench was evidence of a deep-seated, dormant bedrock (rotational-translational) slide. The boreholes were drilled to depths of up to 5 feet. Three (3) of the boreholes were perpendicular to the general trend of the bench (B-1, B-2 and B-5). These boreholes permit construction of a geologic cross-section oriented perpendicular to the structural grain of the property. Borehole B-2 provided additional confirming evidence on the engineering



geologic characteristics of the bedrock bench. In effect, it provided a greater geographic distribution of data than was provided by the aligned borings.

Boring B-3 was located on the tectonic block in the north portion of the property. This block is bounded by dry creek channels. A boring at this locale was intended to explore that southwest-trending feature that appeared to be unrelated to the tecto-stratigraphic units on the remainder of the site.

EVALUATION

1. Bench

The most significant conclusion of our subsurface investigation is that the bench is not a slide-related feature. Borings B-1, -2, -3 and -5 penetrated a soft, flakey, foliated bluish-gray and pale-blue serpentine. The soil was less than one (1) foot thick, and the dominant partings within the bedrock were oriented a) N40°W, vertical $\pm$ and b) sub-horizontal. No free moisture was observed in the borings to the depth explored, but below a depth of 10 feet, the serpentine was moist to very moist. As Radbruch mentions, soft sheared serpentine bedrock is subject to sliding. While we observed no evidence of sliding in the boreholes, the grading concept could create stability problems. (Similar material failed recently in a cut slope that overlooks Redwood Road.)

2. Tectonic Block

The tectonic block in the north portion of the property consists of very dense serpentine. Due to the difficulty of drilling and the massive, coherent nature of the rock exposures, it is our opinion that the block is not a landslide.

3. Swale

East of the tectonic block is a swale area that received some fill during the mid-1950's, when the adjacent property was developed. Our test pits revealed only two or three feet of fill, and the depth to weathered bedrock was approximately five (5) feet. Nevertheless, if this is a sliver fill it could present a potential hazard to any proposed lots at the toe.



RECOMMENDATIONS

In our opinion, the bench consists of sheared, weak serpentine that is likely to be subject to sliding in 2:1 or even 2.5:1 slopes. It is currently supported on its west margin by schist with associated lenses of massive (competent) serpentine. The western schist is vitally important to the stability of the bench, and it should be retained. In our opinion, the schist is a narrow zone and any cuts could result in breaching the schist. Should this occur, the stability of the upslope area would be undermined.

Similarly, the eastern schist may be relatively thin. If cut slopes are made into the material overlooking the bench, it might remove competent schist and exposed weak, sheared serpentine. Weak, sheared serpentine will not stand in slopes steeper than 3:1. If cuts expose this material during grading and 3:1 slopes are not feasible, we recommend that the material in the slope be overexcavated and replaced as engineered fill.

STATEMENT OF LIMITATIONS

Our investigation was based on a review of relevant published materials and previous consultants' work in the area, examination of aerial photographs, a surficial site reconnaissance, geologic evaluation of the data gathered, and preparation of this report.

The conclusions and recommendations contained herein are professional opinions derived in accordance with current standards of professional practice, and no warranty is expressed or implied.

DARWIN MYERS ASSOCIATES



Darwin Myers, C.E.G. 946
Principal



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- Scheimer, J.F., and J. M. Mills, 1984, "Seismicity Rates for Eastbay Faults", Lawrence Livermore National Laboratory, UCRL-53542.

AERIAL PHOTOGRAPHY

<u>TYPE</u>	<u>DATE</u>	<u>PHOTO #</u>	<u>SCALE</u>	<u>SOURCE</u>
Stereo Pair Black & White	05-03-57	AV 253-12-30, 31	1"=1000'	Pacific Aerial Surveys
Stereo Pair Black & White	05-16-69	AV-902-09-28, 29	1"=1000'	Pacific Aerial Surveys
Stereo Pair Black & White	06-21-83	AV-2300-09-30, 31	1"=1000'	Pacific Aerial Surveys



APPENDIX A
TEST PIT LOGS
BORING LOGS



LOG OF EXPLORATORY TEST PITS
JOB NO. 2010.88

<u>Test Pit Number</u>	<u>Depth (feet)</u>	<u>Description</u>
TP-1	0-1	<u>FILL</u> . Rocky, clayey silty sand, light gray, loose fresh blocks of serpentine and schist, dry to slightly damp.
	1-3	<u>TOPSOIL</u> . Pebbly, clayey sand, dark olive gray, many fine roots, mineral soil, slightly damp to moist.
	3-8	<u>MODERATELY WEATHERED BEDROCK</u> . Serpentine, dark olive brown, slightly moist, moderately fractured (spacing 1.5 in. maximum dimension), massive with blocky structure; parting orientation variable: N-S, 53°E N80°, 37°N N-S, 10°E E-W, N28°N
TP-2	0-5	<u>FILLS</u> . Rocky fill with cobbles; base of fill contains blocks up to 1.5 feet in maximum dimension. Remainder of fill contains angular clasts up to 6" in maximum dimension.
	5-6.5	<u>TOPSOIL</u> . Pebbly clayey sand, dark olive gray, many fine roots, mineral soil, slightly damp to moist.
	6.5-8	<u>SEVERELY WEATHERED BEDROCK</u> . Serpentine, severely weathered, soft with some isolated rocky chunks embedded in softer groundmass. Very moist, soft.



<u>Test Pit Number</u>	<u>Depth (feet)</u>	<u>Description</u>
TP-3	0-1	<u>TOPSOIL</u> . Pebbly silty sand, dark olive brown, angular serpentine blocks, damp, loose.
	1-5	<u>MODERATELY WEATHERED BEDROCK</u> . Serpentine, dense, blocky structure (blocks to 1' in maximum dimension). Orientation of dominant partings: E-W, 60°N N60°W, 75°NE M25°W, 34°SW
TP-4	0-2	<u>TOPSOIL</u> . Silty, clayey sand; dark olive brown; slightly moist blocky structure.
	2-5	<u>SHEARED SERPENTINE</u> . Foliated, soft, light gray with yellowish brown staining of partings; exposure on ends of trench reveal orientation of dominant partings: N20°E, 70-80°W
TP-5	0-1	<u>TOPSOIL</u> . Pebbly clayey sand, dark olive gray, many fine roots, mineral soil, slightly damp to moist.
	1-3.5	<u>VERY SEVERELY WEATHERED SERPENTINE</u> . Very dark brown, highly fractured, some soil in partings, orientation of joints variable.
	3.5-8	<u>MODERATELY WEATHERED BEDROCK</u> . Dark brown with yellowish orange staining, moist partings; serpentine highly fractured; orientaton of dominant joint set: N40°W, 50°SW



<u>Test Pit Number</u>	<u>Depth (feet)</u>	<u>Description</u>
TP-6	0-2	<u>TOPSOIL.</u> Clayey sand, pebbly; dark brown; minor organics; desiccation cracks.
	2-4	<u>SEVERELY WEATHERED BEDROCK.</u> Gray serpentine, gradational contacts with soil and underlying moderately weathered serpentine; mottled yellow and reddish brown, moist, soft, some relict jointing.
	4-7	<u>MODERATELY WEATHERED BEDROCK.</u> Gray serpentine with dark staining on partings, massive; dense. Orientation of dominant partings: N30°W, vertical N20°E, 53°NW N75°E, 50°SE
TP-7	0-3	<u>TOPSOIL.</u> Clayey sand, pebbly; dark brown; minor organics; desiccation cracks.
	3-4	<u>VERY SEVERELY WEATHERED BEDROCK.</u> Serpentine, strength characteristics similar to soil; no rock-like fabric.
	4-5	<u>SEVERELY WEATHERED BEDROCK.</u> Sheared, flakey serpentine, dark brown; mottled with yellowish orange staining.
	5-8	<u>MODERATELY WEATHERED BEDROCK.</u> Sheared flakey serpentine, orientation of dominant foliation: N45°W, 65°NE N-S, 65°E
TP-8	0-1	<u>TOPSOIL.</u> Sandy clay, dark olive brown, slightly moist, stiff; minor organic material.
	1-3	<u>SLIGHTLY WEATHERED BEDROCK.</u> Serpentinized schist; strike of foliation: N42°W, vertical



Test Pit Number	Depth (feet)	Description.
TP-9	0-1.5	<u>TOPSOIL.</u> Sandy clay, dark olive brown, slightly moist, stiff; minor organic material.
	1.5-6	<u>SEVERELY WEATHERED BEDROCK.</u> Sheared serpentinite, brown mottled with yellow ochre; damp, significant loss of strength.
TP-10	0-5	<u>SLIGHTLY WEATHERED BEDROCK.</u> Serpentinized schist, light gray, damp, massive; orientation of dominant parting: N45°W, vertical
TP-11	0-0.25	<u>TOPSOIL.</u> Sandy, pebbly clay; dark brown, slightly moist, firm.
	0.25-3	<u>SLIGHTLY WEATHERED BEDROCK.</u> Moderate brown, dense, massive; moderately fractured; dominant partings oriented: E-W, 75°N N75°W, 66°N

Leona Rhyolite



LOG OF EXPLORATORY BORINGS

<u>Boring Number</u>	<u>Depth (feet)</u>	<u>Description</u>
LB-1	0-12	<u>SLIGHTLY WEATHERED BEDROCK.</u> Highly sheared, serpentine, brown, slightly moist.
	12-47	<u>FRESH BEDROCK.</u> Serpentine, highly sheared, pale blue, moist.: Dominant foliation: subhorizontal; and N35°W, vertical
	at 34'	Shear plane: N75°W, 65-70°N
LB-2	0-15	<u>SLIGHTLY WEATHERED BEDROCK.</u> Highly sheared, serpentine, brown, slightly damp.
	15-43	<u>FRESH BEDROCK.</u> Highly sheared; gray to pale blue; dominant partings: subhorizontal W45°W, vertical
	31'	grades harder
	38'	free moisture
	43-48	Serpentinized schist/sheared serpentine; Contact: N30°E, 50°NW
LB-3	0-43	<u>SLIGHTLY WEATHERED BEDROCK.</u> Brown serpentine, blocky structure; drilling rate very consistent; moist. Orientation of dominant foliation: N-S, 30°W N-45°E, 30°NW
	43-47	<u>FRESH BEDROCK.</u> Serpentine, green and yellow, fresh, hard drilling.



<u>Boring Number</u>	<u>Depth (feet)</u>	<u>Description</u>
LB-4	0-21	<u>SLIGHTLY WEATHERED BEDROCK.</u> Serpentine; hard, massive; dark gray to pale green; difficult drilling. Hardest material drilled on site. Drill bits changed at 19'; slightly moist.
LB-5	0-45	<u>SLIGHTLY WEATHERED SERPENTINE.</u> Highly sheared; brown; flakey; soft, moist. From 0-5 it possessed a subhorizontal foliation. At 10', sheared serpentine changed color from brown to light gray; remained soft. Highly foliated. Orientation of dominant parting foliation: at 10' N45°W, vertical at 15' N45°W, vertical at 22' N40°W, vertical at 37' N25°W, vertical at 40' N35°W, vertical



EXPLANATION

Qsu Upper member San Antonio Formation,
 Qsl Lower member San Antonio Formation
 TL Leona Rhyolite
 Ko Oakland Conglomerate
 Kjm Joaquin Miller Formation

sp Serpentine

KJfs Franciscan Assemblage sandstone
 KJfm Franciscan Assemblage metamorphic rock

Jk Knoxville Formation
 Source: Radbruch (1969)

Geologic contact;
 dashed where
 approximate,
 queried where
 uncertain

Fault; dashed
 where location
 approximate

N



USGS GEOLOGIC MAP

SCALE 1" = 1000'

FIGURE

1

DATE 8 - 1 - 88

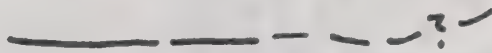
Darwin Myers Associates

JOB NUMBER. 2010.88



EXPLANATION

Special studies zone



Fault; dashed where approximate, queried where uncertain

Source: Oakland East SSZ quadrangle



SPECIAL STUDIES ZONE
MAP

SCALE 1" - 1000'

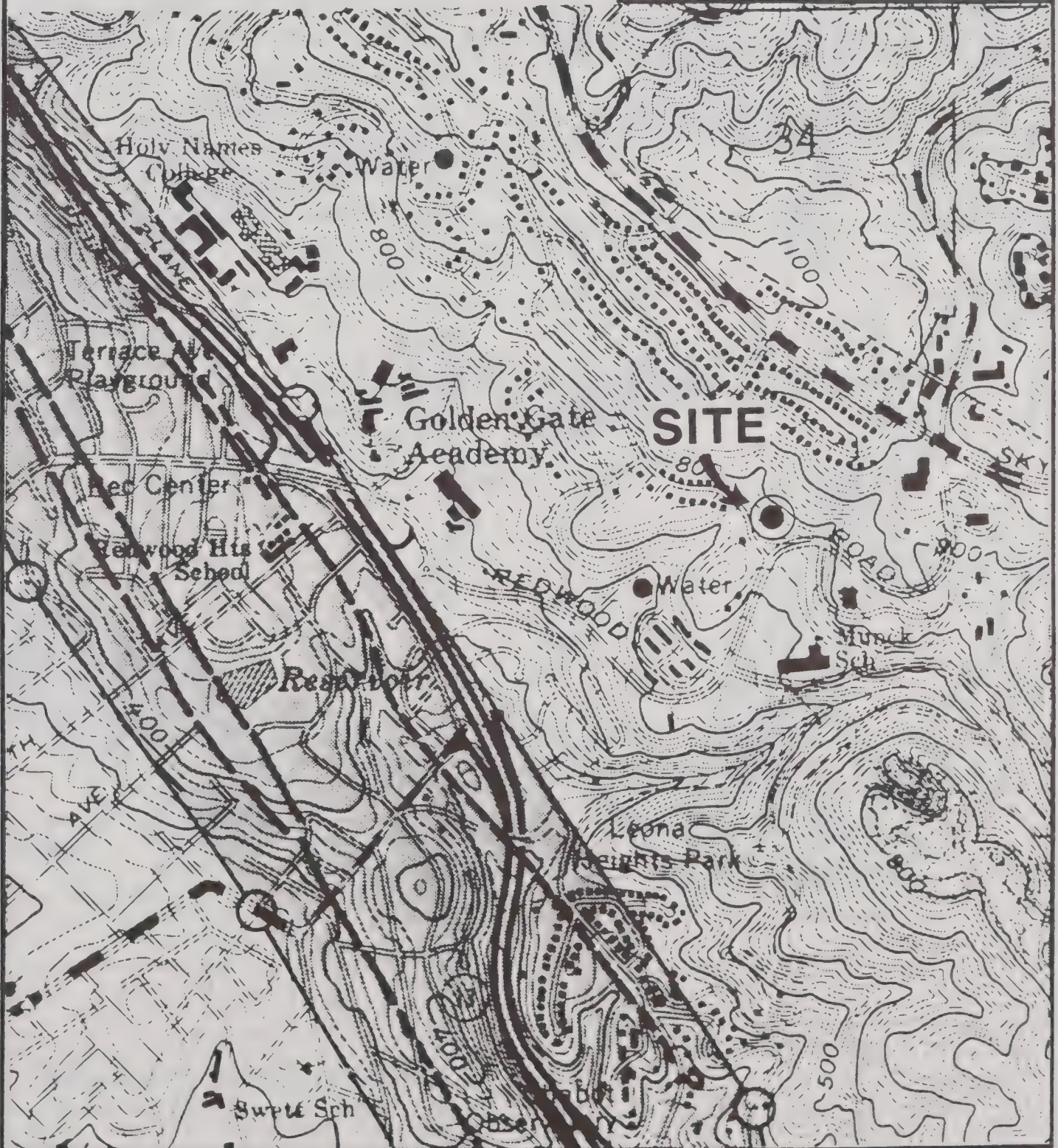
FIGURE

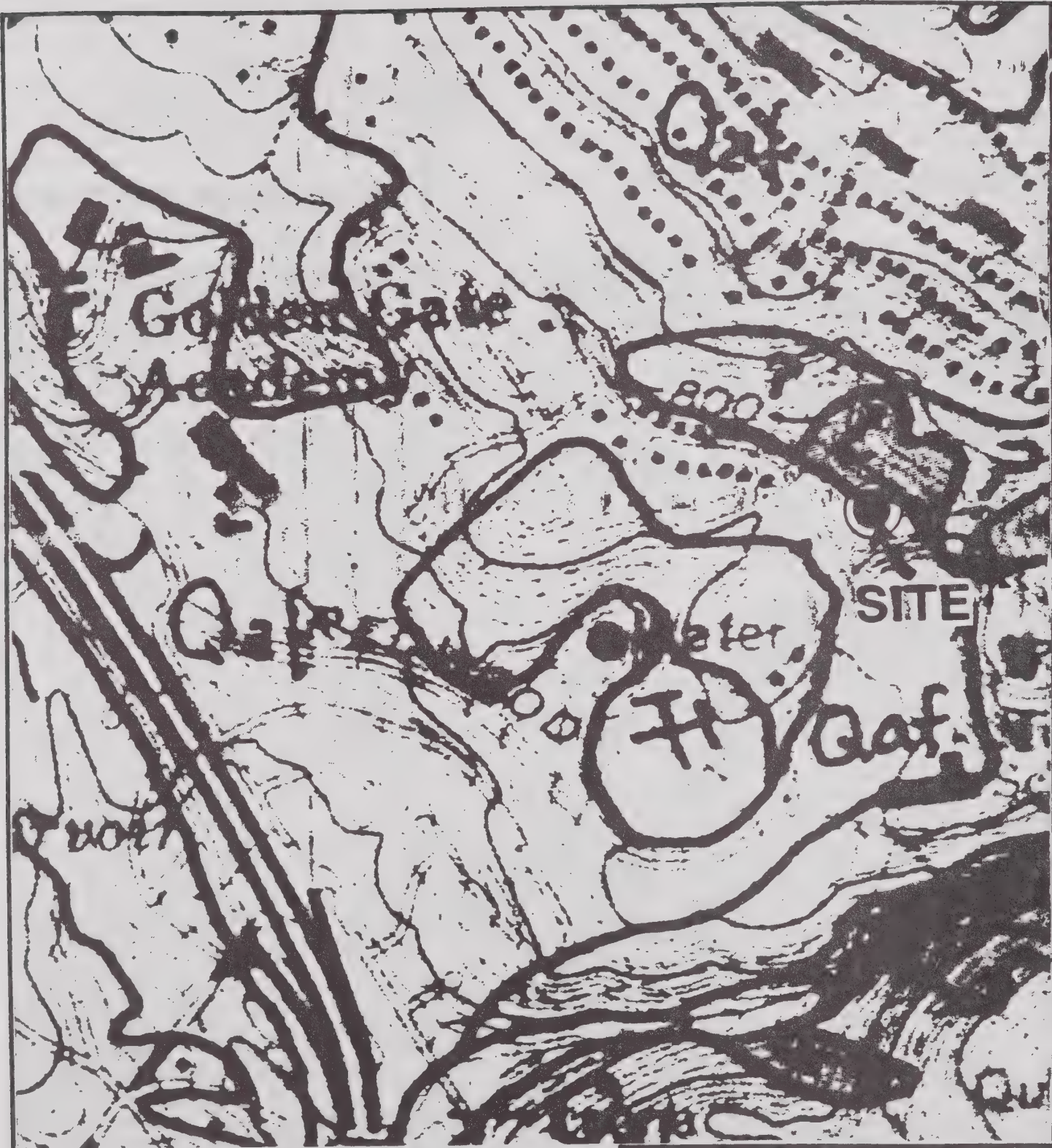
2

DATE 8 - 1 - 88

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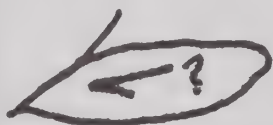
JOB NUMBER: 2010.88





EXPLANATION

Qaf Artificial fill



Photointerpretive landslide;
queried where uncertain

Source: Nilsen (1975)



USGS PHOTOINTERPRETIVE LANDSLIDE MAP

SCALE: 1" - 500

FIGURE

3

DATE: 8 - 1 - 88

Darwin Myers Associates

JOB NUMBER 2010.88

APPENDIX D - BIBLIOGRAPHY

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APPENDIX C

BIOLOGICAL RESOURCES

APPENDIX C

RARE, ENDANGERED OR THREATENED SPECIES KNOWN TO OCCUR IN THE VICINITY OF THE OAKCREST PLANNED UNIT DEVELOPMENT SITE

<u>Taxa</u>	<u>Status</u> <u>(State/Fed)</u> ¹	<u>Notes</u>
PLANTS		
<u>Clarkia franciscana</u> (Presidio clarkia)	CE/C1	This species has been found in the vicinity of Skyline Blvd. in Oakland. It is associated with serpentine outcrops, often growing with Brodiaea (Brodiaea <i>ssp.</i> in the area) (<i>Hemizonia</i> <i>ssp.</i>) and Mariposa-Lily (<i>Calochortus</i> <i>ssp.</i>)
<u>Arctostaphylos pallida</u> (Alameda manzanita)	CE/C2	This species is associated with Monterey pines (<i>Pinus radiata</i>), redwoods (<i>Sequoia sempervirens</i>), madrone (<i>Arbutus menziesii</i>) and coyote brush (<i>Baccharis pilularis</i> var. <i>consanguinea</i>). The Alameda manzanita has been found in the Oakland hills on Skyline Blvd., in the Huckleberry Botanical Preserve, and in areas near Joaquin Miller Park, Roberts Recreation Area, and Redwood Regional Park.
<u>Helianthella castanea</u> (Diablo rock rose) grassy hillsides in grass	-/C2	This species is associated with grassy hillsides in grassland and oak woodland plant communities. The species was last found in the 1920's at Leona Heights, in the Oakland hills.

APPENDIX C (Continued)

<u>Taxa</u>	<u>Status</u> <u>(State/Fed)</u> ¹	<u>Notes</u>
ANIMALS		
<u>Euphydryas Editha bayensis</u> (Bay checkerspot)	-/FT	This threatened butterfly is found in areas of serpentine rock and soils in grassland habitats. Its primary food sources are plant species associated with serpentine soils (<i>Orthocarpus densiflorus</i> , <i>Plantago erecta</i> , <i>Lasthenia chrysostoma</i> , <i>Zayia platygloss</i> , <i>Lovanthus spp.</i> , and <i>Lomatium spp.</i>). The Bay checkerspot has been seen in San Joaquin Miller Park and in the hills of San Leandro.
<u>Masticophis lateralis euryxanthus</u> (Alameda whipsnake)	CT/C2	The range of this rare snake extends from the San Francisco Bay area to the vicinity of Monterey. The species is associated with valley-foothill riparian habitats and has been found in Leona Park and the Grizzly Peak area of Oakland/Berkeley hills.
<u>Dipodomys heermanni berkeleyensis</u> (Berkeley kangaroo rat)	No official	This species is associated with Mixed Evergreen and Coastal vegetation communities. Although historical records show that the species occurred in the Berkeley and Oakland Hills, it has not been seen since the 1930s.
<u>Speyeria callippe callippe</u> (Callippe silverspot)	-/C2	This butterfly has been seen in Joaquin Miller and Redwood Regional Parks. However, records of observations of this species in the area may be erroneous because of the similarity of this species to another butterfly, <i>Speyeria callippe comstocki</i> .

APPENDIX C (Continued)

Source: CNDDDB (California Natural Diversity Data Base) San Francisco, 1987.

¹State Listed Species:

CE = California Endangered Species

CT = California Threatened

Federal Candidate Species:

C1 = Enough data are on file to support the federal listing.

C2 = Threat and/or distribution data are insufficient to support federal listing.

/FT = Federal Threatened

APPENDIX D
TRAFFIC AND CIRCULATION

VEHICULAR LEVELS OF SERVICE AT SIGNALIZED INTERSECTIONS

Level of Service	Description	Volume/Capacity (v/c) Ratio/a/
A	Level of Service A describes a condition where the approach to an intersection appears quite open and turning movements are made easily. Little or no delay is experienced. No vehicles wait longer than one red traffic signal indication. The traffic operation can generally be described as excellent.	less than 0.60
B	Level of Service B describes a condition where the approach to an intersection is occasionally fully utilized and some delays may be encountered. Many drivers begin to feel somewhat restricted within groups of vehicles. The traffic operation can generally be described as very good.	0.61-0.70
C	Level of Service C describes a condition where the approach to an intersection is often fully utilized and back-ups may occur behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so. The driver occasionally may have to wait more than one red traffic signal indication. The traffic operation can generally be described as good.	0.71-0.80
D	Level of Service D describes a condition of increasing restriction causing substantial delays and queues of vehicles on approaches to the intersection during short times within the peak period. However, there are enough signal cycles with lower demand such that queues are periodically cleared, thus preventing excessive back-ups. The traffic operation can generally be described as fair.	0.81-0.90
E	Capacity occurs at Level of Service E. It represents the most vehicles that any particular intersection can accommodate. At capacity there may be long queues of vehicles waiting upstream of the intersection and vehicles may be delayed up to several signal cycles. The traffic operation can generally be described as poor.	0.91-1.00
F	Level of Service F represents a jammed condition. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration. Hence, volumes of vehicles passing through the intersection vary from signal cycle to signal cycle. Because of the jammed condition, this volume would be less than capacity.	1.01+

/a/ Capacity is defined as Level of Service E.

SOURCE: Environmental Science Associates, Inc. from *Transportation Research Circular No. 212*, Transportation Research Board, 1980.

Project Parking Calculations

UPPER PORTION OF SITE -- PARKING DEMAND

7 upslope homes x 7 rooms/home = 49 rooms
8 downslope homes x 8 rooms/home = 64 rooms
113 total rooms

113 rooms x (1 space / 3 rooms) = 37.7 resident spaces
15 units x 0.2 spaces per unit = 3.0 visitor spaces

Total parking demand, after rounding = 38 + 3 = 41 spaces

UPPER PORTION OF SITE -- CODE REQUIREMENTS

15 single family units x 2 spaces per unit = 30 spaces

UPPER PORTION OF SITE -- AVAILABLE PARKING

15 units with 2-car garages = 30 spaces
About 30 driveway spaces = 30 spaces
Parallel parking on access road = 6 spaces
Total available on-site parking = 66 spaces

LOWER PORTION OF SITE -- PARKING DEMAND

16 townhouses x 6 rooms/unit = 96 rooms
1 single family unit x 6 rooms = 6 rooms
102 total rooms

102 rooms x (1 space / 3 rooms) = 34.0 resident spaces
17 units x 0.2 spaces per unit = 3.4 visitor spaces

Total parking demand, after rounding = 34 + 4 = 38 spaces

LOWER PORTION OF SITE -- CODE REQUIREMENTS

16 townhouses x 1.5 spaces per unit = 24 spaces
1 single family unit x 2 spaces per unit = 2 spaces
Total parking code requirement = 26 spaces

LOWER PORTION OF SITE -- AVAILABLE PARKING

4 townhouse triplexes with 5 spaces each = 20 spaces
1 single family unit with 2-car garage = 2 spaces
2 detached double garages = 4 spaces
Perpendicular parking on access road = 3 spaces
Total available on-site parking = 29 spaces

VEHICLE SPEED SURVEY SHEET

LOCATION REDWOOD ROAD - 200 So OF TENNIS CLUB DRIVEWAY

WEATHER CLEAR RECORDER E. THOMSON

DATE 12-30-87 TIME: BEGIN 4:40 END 5:30 PM

85 TH PERCENTILE

MPH.	CUMUL. %	%	TOTAL VEH.	SB	NB	TOTAL VEH.	%	CUMUL. %	MPH.
55									55
54									54
53									53
52									52
51									51
50									50
49									49
48									48
47									47
46									46
45									45
44						2	1.7	100	44
43						1	0.7	98.3	43
42	100	2.7	3			2	1.7	97.6	42
41	97.3	0.9	1			3	2.5	95.9	41
40	96.4	2.7	3			4	3.3	93.4	40
39	93.7	2.7	3			1	0.8	90.1	39
38	91	9.1	10			8	6.6	89.3	38
37	81.9	6.4	7			3	2.5	82.7	37
36	75.5	1.8	2			2	1.7	80.2	36
35	73.7	10.9	12			13	10.7	78.5	35
34	62.8	7.3	8			11	9.1	67.8	34
33	55.5	13.6	15			12	10	58.7	33
32	41.9	12.7	14			12	10	48.7	32
31	29.2	1.8	2			13	10.7	38.7	31
30	27.4	9.1	10			6	5.0	28	30
29	18.3	7.3	5			6	5.0	23	29
28	11	5.5				8	6.6	18	28
27						2	1.7	11.4	27
26	5.4	0.9	1			3	2.5	9.7	26
25	4.5	0.9	1			5	4.1	7.2	25
24	3.6	0.9	1			0	0	3.1	24
23	2.7	0.9	1			1	0.7	3.1	23
22	1.8	0.9	1			2	1.7	2.4	22
21						1	0.7	0.7	21
20	0.9	0.9	1						20
19									19
18									18
17									17
16									16
TOTALS	100		110			121	100		TOTALS

VEHICLE SPEED SURVEY SHEET

LOCATION REDWOOD ROAD @ OLD REDWOOD ROAD

WEATHER CLEAR RECORDER E. THOMPSON

DATE 12-30-87 TIME: BEGIN 3:30 END 4:25 PM

MPH	CUMUL. %	%	TOTAL VEH.	SB	NB	TOTAL VEH.	%	CUMUL. %	MPH
55									55
54									54
53					1	1	0.6	100.0	53
52					11 W/ 1	3	1.9	99.4	52
51					0				51
50					1	1	1.2	97.5	50
49									49
48					1	1	0.6	96.3	48
47					11	2	1.2	95.7	47
46	99.1	1.8	2	11	11	2	1.2	94.5	46
45	97.3	0.9	1	1	11	2	1.2	93.3	45
44	96.4	3.6	4	1111	11	2	1.2	92.1	44
43	92.8	2.90	1	1	11	2	1.2	90.9	43
42	91.9	6.3	7	11111	111	3	1.9	89.7	42
41	85.6	3.6	4	1111	1111	5	3.1	87.8	41
40	82.0	9.0	10	111111	1111111111	13	8.2	84.7	40
39	73.8	4.5	5	1111	1111111	9	5.7	76.5	39
38	69.3	9.9	11	1111111111	111111111111	20	12.5	70.8	38
37	59.4	8.1	9	1111111	1111111111	16	10.0	58.3	37
36	51.3	8.1	9	11111111	1111111111	13	8.2	48.3	36
35	43.2	9.0	10	1111111	1111111	8	5.0	46.1	35
34	34.2	5.4	6	11111	1111111111	13	8.2	35.1	34
33	28.8	7.2	8	1111111	1111111111	12	7.5	26.9	33
32	21.6	5.6	4	11111	1111111	10	6.3	19.4	32
31	18.0	4.5	5	11111	11111	3	1.9	13.1	31
30	13.5	4.5	5	11111	1111111	7	4.4	11.2	30
29	9.0	4.5	5	11111	1	1	0.6	6.8	29
28					111	3	1.9	6.2	28
27	4.5	2.7	3	111	11	2	1.2	4.3	27
26	1.8	1.8	2	11					26
25									25
24					1	1	0.6	3.1	24
23									23
22									22
21									21
20					1	1	0.6	2.5	20
19					11	2	1.3	1.9	19
18									18
17									17
16					1	1	0.6		16
TOTALS	99.9		111			159	100.0		TOTALS

MINIMUM STOPPING SIGHT DISTANCE ON WET PAVEMENTS

<u>Operating Speed</u> (mph)	<u>Brake Reaction Time</u> (sec)	<u>Dist.</u> (feet)	<u>Coefficient of Friction</u>	<u>Grade (Percent)</u>		<u>Braking Distance (ft.)</u>		<u>Stopping Sight Distance</u>	
				<u>Downhill</u>	<u>Uphill</u>	<u>Downhill</u>	<u>Uphill</u>	<u>Downhill</u> -5%(-10%)	<u>Uphill</u> +5%(+10%)
30	2.5	110	0.35	-5(-10)	+5(+10)	100	75	210 (230)	185 (177)
35	2.5	129	0.32	-5(-10)	+5(+10)	151	110	280 (315)	239 (226)
40	2.5	147	0.30	-5(-10)	+5(+10)	213	152	360 (414)	299 (280)
45	2.5	165	0.29	-5(-10)	+5(+10)	281	199	446 (520)	364 (338)
50	2.5	184	0.29	-5(-10)	+5(+10)	347	245	531 (623)	429 (398)

Source: Institute of Transportation Engineers, Engineering Handbook, Table 19-5, 1988.

APPENDIX E
TYPICAL NOISE LEVELS

TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

A-WEIGHTED SOUND PRESSURE LEVEL IN DECIBELS

	140	
	130	Threshold of Pain
Civil Defense Siren (100')	120	
Jet Takeoff (200')	110	Rock Music Band
Riveting Machine	100	Piledriver (50')
Diesel Bus (15')	90	Ambulance Siren (100')
Bay Area Rapid Transit Train Passby (10')	80	Boiler Room Printing Press Plant
Pneumatic Drill (50')	70	Garbage Disposal in Home (3') Inside Sports Car (50 MPH)
SF Muni Light Rail Vehicle (35') Freight Cars (100')	60	
Vacuum Cleaner (10')	50	Data Processing Center Department Store
Speech (1')	40	Private Business Office Light Traffic (100')
Auto Traffic Near Freeway Large Transformer (200')	30	Typical Minimum Nighttime Levels-Residential Areas
Average Residence	20	
Soft Whisper (5')	10	Recording Studio
Rustling Leaves	0	Mosquito (3')
Threshold of Hearing		

(100') - Distance in Feet Between Source and Listener

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